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CALGARTH PARK.

PHILOSOPHICAL
ENQUIRY, &c.

A
Philosophical Enquiry

into the
Nature, Origin, and Extent,

ANIMAL MOTION,

Traced from the PRINCIPLES of

REASON AND ANALOGY.
PHILOSOPHICAL

ENQUIRY, M.D.

Blind words written, as above, with the pen and ink, and
at present, for evidence that some words are the same,
there is no other at present at present.

Printed by T. Becket and P. A. D. Hony

L O N D O N

Printed for T. Becket and P. A. D. Hony

in the Strand,

M.DCC.LXXI.

A
Philosophical Enquiry
INTO THE
NATURE, ORIGIN, and EXTENT,
OF
ANIMAL MOTION,
Deduced from the PRINCIPLES of
REASON and ANALOGY.

By SAMUEL FARR, M. D.

*Illud modo videto, ut deum noris, etsi ignores ejus locum,
et faciem, sic animum tibi tuum notum esse oportere,
etiam si ignores et locum et formam.*

Cic. Tusc. quæst. lib. 1.

L O N D O N:
Printed for T. BECKET and P. A. D'HONDT
in the STRAND,
M.DCC.LXXI.

Philosophical Enquiry

C O N T E N T S

22830

NATURE, ORIGIN, AND EXTENT,
C H A P. I.

OF MATTER in general.

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III. OF THE CAUSE OF MATTER

IV. THE SUBJECTS OF MATTER, AND PARTICULARLY,

V. OF THE MOTION OF MATTER, AND THE CAUSE OF

THESE PROPERTIES OF MATTER

THESE PROPERTIES OF MATTER, AND PARTICULARLY,

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THESE PROPERTIES OF MATTER, AND PARTICULARLY,

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THE LAWS OF MOTION, AND PARTICULARLY,

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INTRO-

INTRODUCTION.

EVERY man may in some measure be said to be born a philosopher ; and notwithstanding that by many ingenious persons the soul has been imagined at its birth to be no more than Carte Blanche ; yet I believe the seeds of science are originally sown in every mind. To think and reason justly is the whole business of philosophy, and it is almost always owing to the will, rather than the faculties of men, that knowledge is so little cultivated among them.

To receive and imbibe ideas from external objects, to retain and keep them in their proper store-house, and to bring them forth at pleasure, and employ

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employ them in the several occasions of life in which they are wanted, are universal faculties of the human mind, what have dignified it with rational powers, and distinguished it from those of the inferior creation. To what higher pretensions can the greatest depths of philosophy presume? It is not in the abilities then we see which may be employed by men, but in the use that is made of them, that persons of science are distinguished from those of more vulgar occupations. The mind, fickle in its enjoyments, as well as eager in its discoveries, no sooner begins to be enlightened with the dawns of reason, than it is willing to extend its power over every object it finds within its reach. But yet it is too great variety which fixes it no where, and destroys in the bud the effect which might naturally be expected. Children are in general more inquisitive than men; they see most objects with the eye of novelty, they enquire into
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their nature and their progress, and they reason upon their origin and their cause. But when they grow up to be men, they perceive objects with the eye of experience, by an insensible kind of reasoning they become acquainted with them, and they discard the exercise of their rational faculties, because they do not immediately see the benefit arising from them.

This is the common case of mankind, when left to the rude process of nature, untutored by education, and unacquainted with the rules of philosophy. Under these disadvantages, however, a genius might arise, inspired with a love of enquiring into the works of nature, and of exercising the original faculties of his mind. To such an one, experience, instead of confining him to what was naturally suggested to him, would excite to a further progress, and constitute a foundation upon which he might build a fabric of future knowledge. From such a beginning we
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may derive the whole scale of human philosophy, first dictated by curiosity, and afterwards improved by emulation. For the success with which such enquiries must be attended, would naturally induce others to pursue them with diligence ; and every man, taking his different part, or attending to those objects to which his inclination disposed him, would soon bring the whole of Nature under their decision. The age of philosophy was originally confined to a few years in relation to the great truths it brought to light. And the gradual improvement it made afterwards will appear trifling, when we consider the rapidity of its original progress. A school of Philosophy was invented as soon almost, as men began to think, or devote themselves seriously to the study of things. In two centuries the whole circle of the sciences was brought under its cognizance, and in a few more, they became so well known, that notwithstanding the variety

riety of opinions, which different sects supported, this form of instruction began to decline and be neglected.— This likewise would have happened much sooner, had the ancient philosophers been as honest as they were wise. But they were men, and their natural dispositions over-powered their love of learning and knowledge. In the first ages of science indeed, they set out with a sole attention to their occupation, and an utter contempt of every other pursuit. They left their antient patrimony, travelled through the most distant countries bare-foot and without food, and were careless of every worldly advantage, whilst they inculcated the knowledge of the truth. But at length, they were attracted by ambitious views, so as to court the favours of great and powerful men, they became fond of gaining popularity by the numbers and quality of their disciples, and they even began to feel and enjoy the benefits of wealth. To secure these things

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then, mere philosophy, grounded upon the truth of things and the phænomena of nature, was not sufficient. These when once they were discovered would easily be communicated, and the philosopher who taught them would have starved by his profession. It was necessary then, that terms infinitely supernumerary should be invented, formal rules be laid down for instruction, nice distinctions and definitions be maintained, and the whole farrago of school-doctrine be adopted and supported.

From hence it happened that philosophy, so far deviating from its origin, became difficult and abstruse; and although many things might be discovered somewhat sooner by the encouragements it received, yet it is uncertain whether they may be esteemed a greater detriment or advantage to the world. This inconvenience has attended them. They have set the most valuable truths beyond the pursuit of undif-

undisciplined persons, and have deterred mankind from following the bent of their inclinations, and from aspiring to know what might easily be brought level to their capacities. At present, when men begin to be philosophers, they are so diverted from the truth, by the tediousness of learning the rules by which they are to attain it, that after they have made a great proficiency, they lose sight of the grand object of attention, and are quite ignorant of the facts they should have learned by their unwearied application.—This is very much the case with Metaphysics, a science, when viewed in a proper light, of the utmost service and utility to mankind. At present it is almost imagined to consist in a peculiar form of reasoning, whereas, if rightly considered, it respects the most valuable truths, which want no other argument than the natural and easy language of common sense, divested of logical syllogisms or equivocal reasoning.

It would be impossible, however, even at this day, to make an universal as well as proper reform in this as well as other parts of philosophy, which would not be attended with danger, uncertainty, and contempt.—We must rest contented then to make the best use of philosophy, as we find her, and as she offers herself to our inspection. And as we embrace the valuable products of her invention, must endeavour, as well as we can, to avoid the incumbrances with which she is overladen.

The science, to which the following Treatise more particularly relates, labours under the same inconvenience with that we have mentioned, although originally much more divested of it than any other. HIPPOCRATES studied the human constitution from nature, and genuine facts that presented themselves to his view, and made but few remarks upon those general principles which might become the causes of disease.

ease. Philosophy and the rules of reasoning he disavowed, and hence philosophers hardly esteemed his works as a part of science. Religion indeed interfered in determining some facts, which had no other foundation than a blind superstition, or a fondness for symbolical numbers. These influenced however every thing besides; but as they were very fluctuating principles, and were adhered to only as a compliment to custom, no stress either in medicine or any other part of philosophy can be laid upon them; and in this view they should be considered by all who attend accurately to the works of the antients.

HIPPOCRATES, the father of Medical Philosophy, we may say however, was the most simple, plain, and instructive philosopher of any of the antients. For whilst the rest delivered their tenets, under the umbrage of obscure and useless terms of art, he exhibited plain truths, founded upon

facts and observation alone. A very sufficient reason may be given too for this method which he adopted. This art was not entirely speculative, as most of the sciences were; it respected the immediate interest of mankind, and the most valuable blessing human nature can enjoy. It was necessary then, that the truths belonging to it, should be delivered in the most simple, easy, and intelligible manner which could be devised.

This was the state of Physic amongst the first professors of the art. But other philosophers could not suffer such an important subject, to escape their notice and observation. Excited by this curiosity, they studied the human constitution as a part of physics, and in order to found a particular branch of science upon it. The universal connection indeed that reigns between the soul and the corporeal part, would require an attention to many circumstances of the latter, to demonstrate
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and elucidate some affections of the former. The study, however, coming into such hands, was involved in all the obscurity, which Logic and Metaphysics could give it. And this at a time, when these studies themselves required an age to obtain a distinct knowledge of them.

In the æra when philosophy slept, this science as well as every other lay dormant ; and Medicine was pursued as a mere art rather than as a part of philosophy ; was confined to the hands of illiterate persons, and was practised only as directed by the most empirical record. But upon the revival of learning, it naturally flowed in the channel with other sciences. The scholar undertook this, as well as any other profession, and it appeared more in the garb of philosophy than it had ever done before. The works of the antients were not confined to schools of learning, and philosophy was laid open to a general view. With these ad-

vantages, physicians not only attended to facts, as they were delivered by HIPPOCRATES, but studied likewise the whole scheme of the human constitution, from the rest of the antients. This would necessarily lead them to a more diffuse view of the subject, and induce them to enquire into the more immediate as well as more remote causes of the several phænomena which appeared. Rules, however, and peculiar modes of reasoning, were introduced with this general view. And a fondness, even at this time, not only of novelty, but of that fame which might dignify particular persons, as authors of a sect, soon encroached upon those advantages of which real learning was possessed. The world has so powerful an influence upon the interests of mankind, that there has hardly ever been an age, in which philosophers, as well as other men, have not directed their pursuits agreeably to its tenets.

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Upon the revival of learning however, one principle prevailed, which was by no means known in its former state. This was a fashion to dress particular truths in distinct garbs of philosophy: And it was encouraged by a blind infatuated zeal, universally to embrace and inculcate whatever seems plausible, because one man has spirit enough to propose it, without any good reason for its support, or any proofs by which it may be demonstrated to be right. From this circumstance, it most probably arose, that CHRISTIANITY, the religion of God himself, and which required no other arguments to enforce it, than what arise from the plain dictates of common sense, was made subservient to metaphysical learning, and was perverted in the highest degree, in order to be brought within the limits of heathen philosophy. The genuine truths of this religion, however, have been happy enough to extricate themselves from
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this labyrinth of mystery, to evolve from that darkness by which they were obscured from the sight of a rational mind, and to shew themselves in their proper colours.

Thus it happened with those truths, upon which the everlasting peace and happiness of our mental natures were founded. The health of our corporeal constitution, though in reality of much less importance, was not so immediately speculative, and required a more distinct contemplation. But yet this study was accompanied with the same obscurity. The diversity of the object seemed in some measure to countenance a difference in the method, by which it was to be learned. And because the one was involved in the veil of metaphysics, the other was confined to mechanical reasoning. In this state, with a little interruption indeed from the chemical philosophy, medical knowledge continued for a length of years. But so fickle and inconstant is the mind
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of man, so inattentive to the evidences of a sound judgment, and so fond of novelty, that the first who dared to break down the barrier of the mechanical philosophy, attempted to advance a theory, equally injudicious, if not more exceptionable, than what was before advanced. This was the theory of VAN HELMONT and STAHL, who endeavoured to establish the influence of a rational intelligent *Archæus*, who was thought to preside over the smallest actions of our system, and by a power more wise than the choice of most men, was fitted to conduct the œconomy of every function, and regulate every disease with which the human body might be infested. BOERHAAVE not only saw the errors of this, as well as of the mechanical philosophy, but he enjoyed a power likewise of rectifying every inconvenience, which arose from them; but the remedies he proposed were worse than the disease, he wanted to expel. This great philosopher

pher split upon this rock. Instead of destroying the system of either philosophy, and erecting a new one upon natural principles, He adopted both in different parts, and thought to account for the several phænomena of the human body by the principles of one or other of these sects. The reason perhaps of this might be, that he himself was disposed to advance the value of that, which was opposed by the reigning opinion of mankind.

At the same time, that BOERHAAVE was the general instructor in physic to the southern parts of *Europe*, HOFFMAN reigned in the north. But his works were little read, and his tenets but little attended to, till the demise of many of the followers of the LEYDEN profession, had abated the universal rage for his doctrine. HOFFMAN violently opposed his colleague STAHL; but he leaned too much to the mechanical philosophy, to advance a system upon free and rational principles, founded
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upon facts and observation alone, and independent of any particular form of reasoning.

The authors, who have contributed most to improve this plan, are the late very excellent Dr. WHYTT of *Edinburgh*, and Baron HALLER: the former of these gentlemen published some years ago a very ingenious essay upon the vital and involuntary Motions of Animals, in which he has very accurately shewn the method by which these unconscious powers act, and demonstrated very clearly that they depend on a nervous influence, and a power of the mind: He has likewise shewn that this power extends to the minutest vessels of the human body, none of which are moved but upon the same principles, with those which are more evident and conspicuous. Baron HALLER deserves so much of the world, for his no less valuable than voluminous publications; that an attention to particular theories could hardly
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be expected from him. Notwithstanding this, however, he has produced one of the most ingenious distinctions that was ever observed in nature: This is a difference which he perceived between the irritable and sensible part of Animals. This difference was founded upon fact and observation, and altho' perhaps his ideas of the causes from which it might arise, do not entirely correspond with what we have advanced, yet we must acknowledge it has constituted the foundation upon which we have built the ensuing theory.

Upon a careful review and attention to this subject, I could not but think that it deserved a more enlarged attention, and that upon this alone, a system of physic might be established. I thought I could discover some principles borrowed from analogy, by which such an idea might be supported, and that in this pursuit, not only the truth in general might be established, but

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that some important lights might be thrown upon parts of Physiology, which have been but little attended to, have been injudiciously accounted for, or considered of no value. I must acknowledge too the great advantages I have received from my worthy preceptor Dr. CULLEN, who in his excellent lectures on Chemistry, particularly those on the Matter of *Fire*, has enabled me to establish my Theory of Analogy, upon principles much more firm and stable than I could otherwise have devised.

The method in which I have arranged my ideas, the sentiments I have produced, as well as the language in which they are exhibited, must plead their own apology. I introduce my thoughts with the greatest diffidence: I do not attempt to instruct, no, nor even to entertain mankind. These are advantages I can hardly expect; but if I have given a train of reasoning to an abler hand, who may extend it, through

through the whole universe of nature ; if I have hinted at a proposition which an exalted genius may improve to a certain demonstration ; if I have contributed my mite to the improvements of future ages, it is all I can desire the candour of the world to allow to a daring, though unworthy offspring.

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PHILOSOPHICAL
ENQUIRY, &c.

CHAP. I.

Of MATTER in general.

SECT. I.

Definition of Matter; Solidity; Extension.

NO definition, or description of Matter, can be given with such accuracy, but what will be liable to very powerful objections; and these are not

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only such as might arise from the cavils of captious disputants, but likewise from the suggestions of acute and candid reasoners. Neither common-sense nor philosophy are sufficient of themselves, to demonstrate to every mind the truth of its existence, much less to describe the properties that belong to it. Both must concur to make a sure and certain demonstration. By the acute reasoning of Philosophers, we may no doubt arrive at the knowledge of some of its forms and accidental modes. But common-sense can more easily inform us of these, unaided by philosophy, and it can rise higher in exhibiting to us its more essential properties and the causes that gave them being.

To every man's own judgment then, common-sense is a sufficient director so far as it goes, but it is not fitted to instruct the rest of mankind, in a knowledge of which they are ignorant. Reasoning upon facts and circumstances, which are previously settled

settled in their minds, is the only method by which we can instruct others in what they do not already know. This is the business of the Philosopher, which may be evident from the following example. The law of gravitation, was discovered and made known to the mind of the inventor, by the dictates of his own understanding; but it was afterwards confirmed to his conceptions, demonstrated to the rest of mankind, and made subservient to higher purposes by mathematical reasoning. An Indian or a Savage, bred up in the wilds of Barbarism, knows that when a stone is thrown out of his hand, it will not fly into the air, but with a determined force which he gives it, and that it will some time or other return to the ground; but the greatest Philosophers, till a Newton arose, had never discovered, that the whole universe was actuated by the same principle.

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IN the same manner, every property of Matter may be discovered. Philosophy can never discover the facts, it only reveals the extent of those facts, after they are once made known. It is original facts only that are necessary in an enquiry into the nature and essential properties of Matter; we shall appeal then to those only that are apparent and evident to the common understandings of mankind, in the description we are going to give of them.

THE first property that we may take notice of in Matter, is, *Solidity*; and, perhaps, this is the only essential property of which it is possessed, and every other may spring from, or be dependent upon it.

THAT Solidity is a property of Matter, all our senses conspire to inform us, and the most abstruse reasoning joins in the assent. We see, and we feel continually, bodies of various forms, all which agree
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in these particulars, that they are composed of different and distinct parts, separate from each other; that these parts can never be conjoined, so as to be made into one, and that they have all a fixed invariable situation. It is likewise equally evident, that every distinct *form*, has an absolute place or situation allotted for it in the universe, and that no other part of Matter, can occupy that place, or fill up that part of space, whilst that body remains in it. From this it will appear, that Matter cannot exist without Solidity, and that whenever the idea of it is suggested to us, that of Solidity is always joined with it. In what then does Solidity differ from Matter, and why is it esteemed a property only of that, which seems to be the same thing as itself? Matter must be considered as nothing but an assemblage of properties, which are essential to its nature, or these properties are so necessary to it, that we cannot divest ourselves of the idea of them, whenever it is offered

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to our consideration; and in this view, Solidity is to be considered only as one of the most essential. This will be more clearly proved, when we have considered Extension, but at present, let us refer it to our senses.

THE least attention will shew us, that there is no difference between the subject and its qualities. Notwithstanding this, however, there is a principle in mankind, of appropriating qualities to their subjects, although either of them, divested of each other, have no existence in nature. This is the case in the present instance, for it is impossible we should entertain any idea of a material substance as such, without Solidity, or that Solidity can belong to any thing but such a body. Notwithstanding this position is evident to philosophical reasoning, as well as common-sense, yet the distinction between Matter and Solidity was not introduced by the former, but was rather founded upon one of the means by which

which common-sense arrives at information. Solidity is not immediately discovered by all our external Senses, but is peculiar to *feeling, taste, and perhaps hearing*. Upon this account, we might suppose, that if we could be divested of these senses, we might have an idea of Matter, without Solidity. I never knew a man who was possessed of the sense of sight alone, but if such an one could be found, the idea of Solidity, I believe, would not immediately suggest itself to him, but it would require some degree of induction and mathematical reasoning to acquaint him with it. From this we may infer then, that the idea of Solidity is not so absolutely connected with Matter, as was first imagined, but depends in a great measure on our external senses.

ANOTHER property that belongs to Matter as essentially as Solidity, is, *Extension*. We become acquainted with this property likewise by one of our senses, but a dif-

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ferent one from either of those, by which we discovered Solidity, viz. that of *Sight*. Genuine reasoning, however, may resolve these properties both into one, and can discover that it is only as they refer to different senses, that they can be distinguished from each other. Whatever is extended, must have Solidity, for parts must appear separated, or extension cannot take place. Again, whatever is solid, must include in it Extension, for parts which are separate from each other, cannot exist in the same part of space. However, we make a distinction in our minds between these properties. Thus, for instance, when we view a mathematical diagram, we have no idea either of Matter or Solidity, but Extension is simply presented to us. From this, Extension might appear to us a more abstract idea, than Solidity. Extension quaquaversum is the best fitted to give us the idea of Solidity. There is no difficulty in finding instances of men who have been born blind, have remained in this state during the whole

whole of their lives, and have never been able to discover many objects peculiar to that organ; and yet there is no doubt, but that these men have an idea of Extension. This may be suggested too without the employing of induction. The idea may be conveyed to their minds by means of feeling, from succession, which must always take place to excite the idea of Solidity.

As we have discovered these properties of Matter by our senses, we may think we have sufficient grounds to venture upon a definition of it from this source; that it is a subject which appears to our senses, solid and extended; or endued with Solidity and Extension.

BUT how fallacious is such a definition? Our senses may be deceived, and disorder may induce us to see an extended body, or to feel a solid one, when no such thing exists in the circumstances we may imagine. And, on the contrary, bodies will be solid
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and extended, and Matter will be Matter, whether we have our senses entire and perfect or not.

NOTWITHSTANDING this, however, it is originally by our external senses, or rather by the natural and easy induction that is made by common-sense, that we arrive at the knowledge of the existence of Matter, as well as, that it is indued with the properties we have considered. But it is not always necessary to enter into a disquisition of properties, in order to explain the subject matter of them. Every one has a clear and satisfactory proof in his own mind, of the existence of Matter, as well as, that these are properties which essentially belong to it, without the aid of a definition, or the influence of philosophy. We have need to appeal then to nothing but what is level to one of the meanest capacity; who would only think his understanding degraded, and his judgment abused, to be questioned upon such a subject.

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WE ought not to be anxious to describe, or define what *Matter* is ; but only to shew what is generally thought to be Matter, must be considered as such. And of this we want no proof, because it carries with it its own evidence ; and every attempt to make a demonstration, would only weaken its influence. We see it, we feel it, and continually experience it, by all our senses ; and as long as these senses exist, we must become acquainted with it : for when Matter is dissolved, our senses will have nothing to act upon, and will become of no use. It is the object upon which they are constantly employed, and from which all our ideas of sensation arise. This is superior to every definition, which is at best but an awkward form of philosophy, and can only be employed upon very abstruse subjects, or the reveries of our own imagination. But the existence of Matter is so evident and clear a proposition, that it is only the cant of learning which can make it obscure, and

and the fallacious reasonings of a visionary, which can make it dubious.

WITH both these defects it has appeared in the world. The first, indeed, might have been the result of philosophical reasoning, tending to confirm what common-sense had suggested; but the latter can be considered as no more than the fanciful project of a flighty imagination, in opposition to common-sense, and inconsistent with sound reasoning. Mankind are so fond of indulging every thing that has the least appearance of genius, that they often forfeit their judgment for the sake of novelty; introduce fallacious and incoherent maxims, rather than suffer obscurity; and, in fine, rather than consent to an old doctrine, tho' ever so plausible, they prefer scepticism to a want of reputation, and draw a veil over the truth, to conceal the errors of their own imagination.

S E C T. II.

Of the Principles of Motion in Matter.

HAVING considered the general notion of Matter, we are now enabled to take a view of its powers and dispositions, or some of those affections with which we see it occasionally endued.

To us living beings continually in action, and either operating upon Matter ourselves, or perceiving it operated upon by such other beings ; or, on the contrary, motionless and in a state of inactivity ; it appears to put on the affections, either of *motion* or *rest*. It is necessary that we should enquire, upon what foundations these dispositions are grounded ; and whether they are principles necessarily inherent in Matter, or entirely independent of it. Philosophy has at times, adopted the notion that both these affections were essential to it, and without
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which, it could not exist. But how vain and inconsistent such reasoning is, I presume will be determined by every one, who views it with the eye of candor. But to examine it ourselves.

THE present philosophy has very much exalted the state of *rest*, by annexing it to Matter as an original, if not an essential property. They have even attributed to it the title of a power or energy, a force, a *vis*, a something which appears as inconsistent with it, as if they had given the power of light to darkness, or of sight to the blind. But let us examine it more circumspectly and attentively, in order to determine how far this notion approaches to the truth. It is certain, indeed, that to our senses, every thing appears at rest, untill it be moved by some agent, such as ourselves; whom we may presume at present to act entirely independent of Matter; and that there is something like a *vis Inertiæ*, or power inherent in bodies, by which they

they seem disposed to continue in that state. But it is a very fallacious way of thinking to imagine, that this is really a power; and it depends upon too great a negligence in the use of terms. For what is power or energy? Is it not a disposition to *act* either spontaneously, or in consequence of some former impression? Thus the power of the human will, is that power by which we may exercise the muscles of our body by a spontaneous action of our mind; and notwithstanding the mind is often inactive in this respect, yet the power subsists, while the instruments have the disposition to be brought into action; but if by any accident or disorder, any of the muscles should become incapable of acting, we may justly say, that the power is absolutely lost. Again, the human mind, with regard to itself, is possessed of a power, first of receiving, and then of associating ideas; and this is an instance of a power to be exerted in consequence of a former impression; but is no
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more a power, than whilst the mind is capable of those affections. Let us try Matter then by these rules, and see if it be endued with any such power as what we have been mentioning. It seems to be an absolute contradiction to suppose it; for can we imagine any thing in an absolute state of rest, which shall include in it a disposition to action; or is it more disposed to motion, than when that affection has taken place? Again, if the power be to continue in that state of rest, then, that state of rest must be a state of action, because power is a disposition to act. The result of such reasoning will be this, that Matter, being at absolute rest, is disposed to act, in order to continue in that state. And thus we have a state of inactivity endued with action, or a motionless motion, than which nothing can be more absurd. So far with regard to the term, which has only been invented, perhaps, for want of a better; or from an inclination in mankind, to give every thing in some
measure

measure the appearance of dependent causes and effects, without consulting the impropriety of names, or the fallacy of such reasoning. But it is of no great consequence, whether we suppose it a power or not, when we consider this affection by no means as inherent in Matter, or dependent upon any of its properties. For if we exclude it entirely from Matter, any terms that are applied, can be of no value. We shall call it therefore a *state* of rest, and in examining whether it belongs to matter as a property or not, let us appeal to *common sense*, the most impartial judge in such cases. We observe a body or piece of Matter, totally at rest, but in such a state as that, we know it may be moved; and upon different occasions, we have seen it moved before, although at present, we observe the power of motion has ceased. To what would a common understanding attribute this rest then, which he sees it enjoy? Would he imagine it to depend on some power inherent in itself, or a disposition to that state; would he think that it had received

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any accession to its properties, or that it differed in the least from what it was when in motion, except that it enjoyed a different state. Suppose a man should throw a bowl out of his hand, and strike it against the ground, where it remains at rest; does he imagine the bowl is different in properties, from what it was when in motion? No. But he conceives of it in this manner; that the rest, or stopping of this bowl, is entirely dependent upon his own ceasing to act upon it, and suffering it to continue in that state. From hence it may appear that this state, is only a negative to that of motion, and where that ceases, this must always obtain. It will be necessary therefore to examine a little into this state of motion, in order to explain more particularly both these affections.

MOTION is very probably that state that obtained first in the universe, and we never entertain the idea of rest, but that of motion always suggests itself with it. But by all our senses, we are accustomed
more

more to motion, than we are to rest; hence it happens that we refer every thing almost to that state, and from this it was, that the most antient philosophy esteemed it as an essential property of material substance. This doctrine has prevailed very much since, but it has been the origin of one, the most injurious to the human, as well as divine nature. Direct Atheism was soon suggested by it, and the materiality of the soul was its genuine offspring. If motion was a principle of matter, then matter could do every thing, could create, form, and destroy, could think and act in the human mind, and was capable of infinite wisdom and power. But this doctrine was no more iniquitous than false, and may easily be confuted by the most vulgar understanding.

To discover, however, whether motion be an essential property of Matter, we must previously enquire into the causes which give rise to it : But this must be the object of a particular Section.

S E C T. III.

Of the Causes of Motion in Matter.

I N every object of nature, that presents itself to our senses, we are desirous of seeking a cause for almost every circumstance which belongs to it; and we are willing always to attribute it to something that appears to us plausible enough to produce these effects. But we are as often mistaken, as informed in this point. The mere suggestions of fancy, are not always sufficient for the purpose. We must sometimes ascend higher, we must examine every thing carefully and with attention; we must draw analogies from many other objects which surround us; and, in fine, we must reason fairly, and from long deductions, in order properly to attain a knowledge of the origin of the Phenomena of nature.

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SOMETHING of this must be admitted here, in our enquiry, concerning the causes of the more general motions, which we often see produced in the universe. Many of these, and the effects consequent upon them, we see produced from some prior motions, that have taken place ; but are we to conclude from this, that these motions are the original causes of these things, and be left afterwards to account for the causes of these motions themselves ? Let us rather try if we cannot discover the universal origin of all, from one simple uniform principle. Common-sense, will in some measure, tend to inform us of this truth, although in this respect, it is not so accurate, but it wants the assistance of analogy and higher reasoning to confirm its suggestions. For it is never so perfect, but as it is often thwarted by the interruptions of fancy, so it draws its principles too frequently from the flights of imagination. It is the most complete, when confirmed by just reasoning.

WE may divide the actions or motions that we see produced in nature into two sorts, those which evidently acknowledge the action of some spiritual Being upon them, endued with a locomotive faculty in itself; or those which seem spontaneous, and which we can refer to no direct cause. But are we to deduce upon this account such actions from no cause, or which is next a-kin to it, acknowledge the influence of a *material* cause? The most rational kind of argument seems to be this; that as we see many actions produced by Beings which are already denominated spiritual and immaterial, and that Motion is a certain and necessary effect of their power; why may we not refer those that acknowledge the most secret causes to the influence of such Beings, although of a higher and more exalted nature, in proportion to the effects to be produced by them.

I MOVE a stick or a ball, at which time I am conscious to myself of no prior action upon my Body as the cause of the motion which I produce, but it appears as the mere spontaneous effort of my will. I see another man do the same thing, and I argue, that his will is as intimately concerned with that motion, as mine was with the former ; and if I should see a thousand actions of the same kind, I always refer them to the same principle. But I likewise see the Sun or Planets revolving in their respective spheres ; and many other actions produced where motion is perceived, but there is no peculiar agent to which we can ascribe the effect ; but what forbids that I should not acknowledge, that an invisible Being of the same nature as myself, though infinitely more perfect, should be the immediate cause of the revolutions of these Globes, in the same manner as myself or any other Being was the cause of the motion of the ball in my hand, which was before-mentioned. This is an argument drawn

from Reason, from my own nature, what a Savage upon reflection would imagine, unaided by learning, untaught by philosophy, and unbiaſſed by the prejudices of education.

AND indeed this is a fact: the commonſenſe of mankind generally leads them to think, that theſe ſtupendous machines are immediately actuated by the power of the Deity; and if it had never been diſcovered that they were influenced by a peculiar principle, Philoſophers would have thought ſo too: but in maintaining this as an effect, they neglected or forgot the cauſe by which it was produced. The Law of Gravitation, a principle of ſuch infinite importance to mankind, and which will for ever immortalize the name of its author, has nevertheleſs this flaw, it partakes too much of Matter: Of this Sir Iſaac Newton himſelf was aware, and he would gladly have evinced the action of the Deity as the cauſe of it; but probably he thought it

too

too metaphysical, could not properly be introduced into a mathematical system, and would leave a door too open to Uncertainty and Scepticism. He was willing to tread upon sure ground; and although he went one step higher than could be absolutely demonstrated, yet he made no other improvement of this fact than extending the chain of matter a little further; and even concerning this, his modesty, which ought always to be admired by every searcher into truth, forbade more than conjecture.

THE Law of Gravitation was so universal a principle, that it did not immediately attract the attention: The vulgar indeed would never have thought it worth while to think of it; it was sufficient for them that such a law was established: But it was no sooner discovered by the investigators of truth, but they were willing to find out its cause also. But how they could ever attribute it to a principle inherent in Matter, is inexplicable, and argues how
much

much mankind are often instigated by fancy, more than the dictates of common-sense, or a sound Judgment. It might have proceeded perhaps from a mistaken respect to the Author of their existence ; or an inconsiderate devotion might induce them to believe, that it would depreciate the character of the Deity, to be so intimately concerned with human affairs. And thus, rather than be guilty of an imaginary impiety ; they run the risk of destroying the very essence of that nature, which was the object of their adoration, reduce his immensity to nothing, and perhaps make materiality one of his essential attributes.

BUT what is there in the general idea of Matter, that should induce us to think, that this Law of Gravitation, or any other law of motion, should essentially belong to it ? That Motion is an inherent property of Matter we have already endeavoured to disprove ; but it may be alledged, that although in the general abstracted idea of it,
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it is not an essential property, yet that the Deity may have originally impressed it with this faculty at the creation of the universe. This however, as well as the more general argument may I think be invalidated by this simple answer, viz. That if Motion were so essential a property of it even in its present state alone, it must continually be in motion, and that property be necessarily attendant upon it; or else, that it must be endued with a degree of sensibility; or a power of moving, in consequence of impressions made upon it by spiritual Beings. That it does not enjoy the former of these affections, is evident from this, that bodies are so frequently found at rest, and afterwards have their motion renewed. And the existence of the latter, would either endue every part of Matter with a peculiar mind, or reduce all action to material influence.

FROM

FROM all that we have said then, we may deduce this conclusion : That there is nothing in Matter that promotes its own action, but that it receives all its motions from some spiritual Being, who is himself endued with absolute activity and spontaneous motion : That in the state in which we continually observe it, it is entirely passive, and that whenever it is seen to move, it is influenced by this immaterial cause ; either that Being perhaps, who superintends the whole Universe, and is immense as well as omnipotent in his existence ; or else, some inferior Nature such as ourselves, who are conscious of being endued with such a power in a lower degree, that we can move ourselves whenever we please, or excite other parts of Matter to motion.

IN all our ideas of Motion with regard to Matter, we must take into consideration the Agent who causes and directs that action, and the patient or body upon which
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it acts: The Agent must necessarily be a spiritual Being, devoid of Matter and independent of any bodily affection. It may be imagined very difficult to form any idea of a spiritual Being; we are conversant so much with corporeal forms, and from our external senses we experience nothing besides. But we may derive information likewise from our internal faculties, which can never deceive us. We are conscious within us, of something absolutely independent of our organs of sense; we are conscious too of perceptions even from them, that are entirely sufficient to convince us, that it is not owing to any material substance that Ideas are conveyed to our minds. To think is one of the greatest blessings of human nature, as it informs us of many just and valuable truths; but it is a peculiar source of happiness to us, as it leads to the knowledge of the supreme Intellect, who governs through all material substances, and is the Creator of our existence. For He is original, and we are derived only from his Essence.

Effence. He is the supreme Creator of all things,---we poor humble creatures.---He is the Sum of all Life,---we the poor pensioners of an Hour. It is from our own, however, that we are enabled to judge of his Existence and his Power; and if we can move the muscles of our bodies, what is there which He cannot effect with ease and pleasure?

S E C T. IV.

This Subject examined more particularly.

L E T us enquire a little further into this subject, and see if we cannot bring this doctrine of spirit to a determinate, intelligible, and approved standard. It may be objected to us, that our senses may be deceived, and in consequence of that, we ought to refuse the decision they shall bring to any fact. The influence even of our
internal

internal feelings likewise, may be disqualified from determining any thing more than what they immediately suggest. Thinking it may be alledged, is a proof of thought in that Being who is conscious of it, but is no certain argument that it exists in others, even of our own species, much less in any other scale of Beings. To determine this point, we must argue in the following manner. Every man experiences within himself two distinct parts; the natural state of one of which, is to be at rest, the natural state of the other, to be moveable and active. He finds likewise, that when he wants to alter the natural state of the former of these parts, that he is obliged to make use of an impulse of the latter. Now this alteration can never be induced, but Motion must arise to procure or effect it, or this change can be influenced by nothing prior to the taking place of action. Motion then is the first effect that is produced in our bodies by our minds, and is necessary for the production of every other: And
likewise

likewise whenever it is occasioned, it is always by means of that thinking active principle, of whose presence we are conscious within us. Whenever therefore we perceive a motion or a change of state produced in the bodies of other Beings, which we continually do every day of our lives; we are naturally led to conclude, that this is procured by the same principle which we know directs our own actions.

IF we can justly refer the foregoing observation, to all those beings of our own species that we observe exercising this power; and besides this, who will acknowledge the influence of such a principle, to invoke them to action; it will arise to more than a probable proof, that every motion that we see produced in nature depends upon such a power, and is performed by some spirit acting upon it and directing its effects. That all the actions even of animal Beings, are performed by a spiritual cause, we confess is not evident, at first sight:

But

But we shall endeavour to prove hereafter, by a long deduction, that these as well as every other action of nature, are owing to the same principle. At present our subject leads us to this observation, that there is nothing inconsistent in itself, or repugnant to common-sense in the notion of an universal influence of spirit over Matter. We can have no true idea of Matter, but as connected with its essential properties of solidity and extension, and in this, Motion can never be included; when we see it then produced, we are naturally led to seek for a cause from some other source. We find the fountain from whence it springs, we determine its existence, and we conclude it to be its cause. There is nothing in the original nature of cause that should include Matter in it, any otherwise than as secondary to a prior one; and the idea of cause leads us as soon to spirit, as the idea of effect leads us to Matter. It is only those that by a narrow confined view, can

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conceive of things merely as they appear to exist, and are incapable of referring them to their causes, that can admit the idea of material ones. They who reason justly, will undoubtedly be led to imagine, that the first original cause in nature must be spiritual, as well at that sublunary effects are material. Thus when I see a man walking before me, and the idea of the action solely enters my mind, I may conceive of it as a mere effect of Matter in a state of motion, or moving from one part to another; but when I reflect upon this action, endeavour to account for it, and refer it to a cause, I always then look upon it as the action of a spiritual Being, and influenced by that thinking principle that resides in his breast. And no natural reasoning will ever convince me that it is the mere mode of Matter, or the effect of an unknown quality that belongs to it. The same reasoning will hold good, when we reflect upon higher natures, and the stupendous

pendous effects that are produced in the universe.

There is, besides what we have mentioned, another means, by which mankind are liable to fall into error, and have their judgments obscured, whenever they reflect upon this subject. This is the confusion that arises from want of distinguishing the power that Matter has of communicating Motion, from that original principle which gives the first spring to its existence. This is indeed certain, that one material substance will often be seen to occasion the motion of another ; and this not only in the same direction, but in contrary ones. The former part of the position may easily be explained. Bodies in that case must be taken not singly but collectively, and the force that is exerted must be considered as if there was only one body extended to the bulk, we see the different substances that act upon each other. This law can never take place, but upon con-

tact, and that with regard to Motion, will be the same as if bodies were absolutely joined together, so as to make but one part of Matter. The latter part of the position is more difficult to understand and explain; and as it results from some particular motions of Matter, we must refer it to their consideration.

S E C T. V.

Of the Motives upon which the Causes of Motions in Matter are excited to act.

WE have hitherto endeavoured to determine, that Matter is an inactive motionless substance, and that Spirit is that power that gives existence to its Motion, and causes the different revolutions of nature: Let us now examine some peculiar circumstances that result from the connection between them, and enquire into the nature

nature of Spirit more particularly. We have already spoke largely of Matter, and given that description of it, that seems most agreeable to common-sense: But we have considered Spirit only as endued with activity. It may enjoy perhaps other properties, that it will be necessary to evolve, in order to discover its full extent in creating, or causing Motions.

WE have alledged, that Motion arises from a spiritual substance, or something *ab extra* in bodies; but we may go still further, and enquire into the motive upon which Spirit itself is endued to action, or the cause that occasions it to exert its powers. We do not see Matter always in action, neither do we perceive in it a constant endeavour to Motion; but there is a state of rest, the negative to Motion, which it often times enjoys: When ever then it is excited to alter this state, it is not only necessary to call up Spirit for this purpose; but there must be some motive, some reason given

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why this change should take place, or otherwise it would always continue in its original condition.

MOTION, it may be alledged, perhaps, is eternal, and the original state of nature; and that there is no such thing as absolute rest, but in the imaginations of men. This reasoning however will have no effect here, because we are certain that a relative rest between certain parts of Matter, does take place; and if this is the case, a motive must be allowed, to re-assume Motion, if not originally to give it Matter. In consequence of those motives that are necessary to excite motions in material bodies, we may observe that Spirit is not only endued with activity, but is in some measure passive and is itself at rest, till roused to particular actions by these causes.

BUT let us now enquire into the peculiar motives that operate in exciting these causes to act. The first and most original that
offers

offers to our consideration, is the spontaneous will of that Being who gives life and motion to all things, instigated by nothing but his own pleasure, to order and direct whatever actions he thinks fit: These actions may seem entirely spontaneous, and to be divested of all motive, but if ever material Creation had a beginning of existence; and if the least alteration has taken place since their first origin, there must be some concealed and unknown cause why this should take place, or action could never be produced. These motions are truly beyond our conceptions, but they are what direct the great and stupendous works of nature, such as were first excited by the great Author of our being, and such as continue in the exercise of his power throughout the universe. But actions may not only be induced in this spontaneous manner, but they very frequently acknowledge more sensible motives, and may arise from the perception of other motions that already began in

Matter, or a state of rest that has taken place. Thus if it is perceived by a spiritual Being that one part of Matter is liable to become destructive to another, a kind of third or mediatorial action may be interposed to prevent its destined purpose; or if it is perceived to be salutary, to promote this end. This is evidently no spontaneous action, but arises from a motive suggested by another action previously excited. Perhaps it may be necessary that spontaneous action should first arise to give existence to this, and it may only follow as an effect of its influence; but it is very different from it, not only in its nature, but likewise perhaps in the different kinds of being upon which it is often exerted.

WE cannot be certain of the extent of such actions, they must probably reign through all nature; but we are sure of their existence in the human constitution. We must beg leave to call them sensible actions,

actions, because they arise from a perception of actions in other bodies*.

WE have now seen not only the immediate causes of the motions of material substances, but have enquired likewise into the motives from which they arise; and by this we are qualified to enter more particularly into the explication of the different kinds of motions in the universe. What we have already mentioned has been entirely material, determined, and fixed to one peculiar kind of substances, and instigated by one

* The term Sense may be employed here, whilst the signification is so general, and not opposed to any peculiar circumstances of our constitution. It is rather too unlimited a term; but as the principal actions of this kind, are the sensible actions of animals, we need not be under much concern, to apply it analogically to other beings, after we have declared our intention. Sensation does not always convey with it the idea of consciousness; this we shall explain hereafter, but previous to that consideration, it was necessary to warn our readers of this exception, lest they might be apt to confound these principles, in many applications that may be made of them, particularly in this place.

one univerfal principle. We fhall not only enquire more particularly into the modes by which this Agent operates upon it ; but alfo into the actions of more particular beings, confined to a narrow region, infligated by fublunary views, and very much circumscribed in their action.

CH A P.

C H A P. II.

Of the particular MOTIONS of MATTER.

S E C T. I.

Of Gravitation and Attraction.

TO compare the motions of what we call inanimate things, with what we understand to be alive and animated; or to explain from their actions those that we may observe in ourselves; may appear too mechanical for the present philosophy, and ridiculous and inconsistent in itself. In the following treatise, however, we hope to accomplish both these purposes, and yet avoid such general censures. We shall begin with the particular actions of material Substances, as they
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are in themselves the most extensive, actuated by the most general principles, and and the most evident to the common understandings of mankind.

THAT this world, and the whole universe, perhaps, was actuated by a mind or soul, in the same manner, as the motions of our bodies are directed by a living principle, was a very antient notion of philosophy: Although this principle may be false in the manner that antiquity conceived of it, viz. as a peculiar being appropriated to this system, to receive impressions and perform motions independent of any other; yet that all the particular motions of matter are directed by a supreme Mind, as we have already said, may have a very just foundation. But whether all these motions are actuated by one principle or not, is not our business to enquire. It is sufficient for us to shew that any mind is concerned in them, and that they are not merely affections of matter, or an original impression
given

given to it at the creation. In the particular motions of matter, we may observe, indeed, the most simple principles, and all directed by very few laws. If we attempt to infer from this, that the actions which result from them, are not immediately but originally impressed, we are guilty of a great error, in mistaking peculiar actions for a general law. The latter is regular, uniform, and simple, but the former may be highly complicated, and admit of the greatest variety.

THE laws of Gravitation are constant and accountable, but the actions which are influenced by them, may be very inconstant and unaccountable. For instance; It is a fixed law of God, that the Earth shall revolve round the Sun in a stated time, and never alter its course; but the effects of this revolution on our earth are diverted by a thousand circumstances; cloudy days, moist earth, unfruitful and worn-out soil, and the differences of climate and situation, all contribute their share, though by the same

same laws, to make the greatest confusion and variety in the effects produced by them. But to examine these motions more particularly.

THE most simple law or principle of Motion, which is generally observed in the constitution of the universe, is that of Gravitation. We shall not at present enquire into the most minute circumstances of this law of nature, it will be sufficient for us to demonstrate that something more than Matter is necessary in its production, and that whenever we see it exerted, some spiritual agent is employed for that purpose. It is an action that is very universally observed, and upon this account may very possibly be brought under the cognizance of common-sense. By this decision let us endeavour, if possible, to determine the truth of our position, upon as good a foundation as if supported by philosophy. When philosophers speak of Gravitation, they intend only the contemplation of that
certain

certain and invariable law that is established between different parts of Matter ; but do not in the least satisfy us with regard to the powers that cause it, or demonstrate to us where it exists. But the vulgar look more to the cause, and disregard the extent of this principle. Besides, those philosophers, who have attended to this, led on more by abstract reasoning, than the information of their senses ; whenever they have attempted to assign a cause, have affixed it to that which cannot possibly exist in such a relation, by endeavouring to find it in the body acted upon, rather than in that which seems to act upon the other. Thus for instance in the law of Gravitation, our present object ; it has been always imagined that there existed in the larger body, a power that attracted the lesser to it, rather than a power in the smaller which impelled it to the more considerable. It is not to our purpose to attempt a philosophical confutation of this error ; we shall trust to the eyes of the vulgar, who observe it in a more
natural

natural view, and principally attending to the cause, find it in its true place, and where alone it can possibly exist. The experience that they derive from the actions of themselves, and the rest of mankind, informs them that most bodies are only moved by their own immediate agency, and from hence they are convinced whenever they observe one of their fellow creatures moving any part of matter towards another, that the power of motion resides in the man who moves the body, and not in that body towards which it is moved. From hence it happens, that when they see a ball fall out of their hand to the ground, it is more easy to infer that there is a force *ab extra* belonging to that body, which impels it to the earth, than that there is a power inherent in the earth which attracts it to itself. This will be more evident perhaps if we consider how we feel ourselves upon a review of the powers of Electricity and Magnetism. That power which seems to attract, appears forced,
unnatural

unnatural and inconsistent; whilst the repelling power carries with it more of a natural, easy and agreeable appearance. We are accustomed to the one, as I have said, from the general actions of human nature, to which the other seems absolutely contradictory, and in consequence of that, unnatural. It may be observed that by the same powers by which we drive bodies from us, we seem likewise to attract them to us; and if we consider these actions aright, we shall find that they are all of the former kind, and that the power by which bodies are attracted towards us is by an Impulsion from the center of Motion, of those instruments which are employed for this purpose *.

FROM

* All the instruments of Motion in our bodies are levers, which are all acted upon by one simple piece of mechanism, viz. the contraction of the muscles, and the difference of impelling and attracting depends only on the situation in which the muscles are placed upon the bones; the former being placed on one side and the latter on the other: By this they obtain the

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distinguish-

FROM the imaginary idea of the cause of Gravitation in bodies, which philosophers entertained, arose not only the character, but the appellation of it as an attractive power, and it was called the Attraction of Gravitation. A name which is liable to great censure, as inconsistent with the propriety of denominating things, and as not philosophically characteristic. Gravitation implies a law or power in the active body, Attraction in the passive one. If the acting body is made to move by its own Gravity or Weight, there is no necessity for an Attraction; and if it acts by Attraction, there is no necessity for Gravitation.

distinguishing names of Flexors and Reflexors, but they have both the same fulcrum, and always impel from the center of Motion. To give an instance of each of these actions; if I strike a blow with my hand, I contract the Reflexor muscles of my arm, which stretch it out to its full length and raise the lever one way; but if I draw any thing towards me, I contract then the Flexor muscles, and raise the lever in the contrary direction.

tion. Certainly one power of action is sufficient, at least it is more simple, and more consistent with the general Tenor of the Divine Laws. This distinction was probably instituted to distinguish this Attraction of Gravitation, from other exercises of that power; but if it was an Attraction, would it not have been better to have distinguished it by its real difference, than by a term that disqualifies it from any relation.

WE now proceed to another kind of Attraction, viz. of Cohesion or Adhesion. Let us examine a little into this other grand law of Nature, and see whether it can with any justice be determined to be a species of Attraction. Philosophers have indeed decided this question in the affirmative, but to the eye of common-sense, it is no more evident than was the law of Gravitation. We have no original idea of Bodies being kept in contact, but from the observation of our own actions; and this acquaints us

that they remain so, only whilst we operate upon them, or fix and entangle them in such a manner as that they cannot possibly be disengaged; but upon that ceasing, we see them entirely removed from each other, and the law become void. From this circumstance it is, that we very naturally reason upon other bodies which we see in similar situations, and imagine that they must be kept there rather by some unseen intelligent Cause, which acts *ab extra* upon them, than that an attractive power should really reside in the bodies themselves to keep them in contact.

THIS power or law of Nature, which may more properly be called the Attraction of Adhesion, is very extensive throughout Nature, is esteemed the Ground-work of that philosophy, which treats of the particular qualities of Bodies, and has a great share in what relates to the general nature of them: But every law of Nature cannot be explained by that of Attraction, if any
will

will admit of this explication, when considered in a just light, and viewed not only with the eye of common-sense, but also of reason and genuine Philosophy. Electricity, Magnetism, the common Elasticity of many bodies, particularly the Air, and the repelling influence of many parts of Matter, may convince us that another principle diametrically opposite to the former does prevail, and has a very considerable influence in the operations of Nature.

S E C T. II.

Of the Law of Repulsion.

IN the usual and common face of Nature, Bodies are always either joined together in their distinct parts, or separated from each other; which gives rise to a particular disposition by which they are inclined to either of these states. The disposition to adhere together, we have already considered, let us now examine a lit-

tle into the opposite state by which bodies already adhering, are disposed to separate and become distinct; or if they are already separated, to continue so, and resist all approaches to each other, and to become united. The principle upon which this is founded, is called the Law of Repulsion, and is what we every day observe; for there is no law of Nature that we meet with more frequently. The ascent of Vapours and the elasticity of metallic Springs seem to assure us of its existence, almost as certain as any other law that reigns in the universe. The reason of this is, because every one must, and cannot avoid observing these effects. But experiment and more acute observation, convey to us an infinite fund of examples of this principle. The vulgar eye sees it, and cannot refuse its assent: but the Philosopher, I mean the experimental as well as the mechanical, proves, demonstrates and confirms it. It is no where more evident than in the power of the Air, a body we are so intimately acquainted

quainted with; and which exactly answers the idea we have given of this law, by continually expanding itself of its own accord, wherever it can meet with room, and resisting every offer that is made to condense it.

THUS it is seen in that simple Element which we all know, and upon which the mechanic exercises his profession; but further researches into the intimate nature of many parts of Matter, and an experimental enquiry into their most minute particles and qualities, have very much enlarged and extended our views upon this subject. By these we have seen that an apparent quality, circumstance or affection, induced upon them, such as heat, will cause this law of Repulsion universally to take place, and destroy all tendency to attraction. If then, by this single circumstance, all the powers of Nature shall become changed, and acknowledge one simple universal principle, Gravitation lose

its Gravity, and Attraction become repellent; it is worth our while to enquire into the reason of these phænomena, and see upon what principles bodies are influenced in such a manner.

WE shall begin in this consideration with a proposition, which although it may seem strange and unaccountable, and want abundance of proof, yet we hope to confirm it by rational arguments. It is this, that Matter does not primarily act as material substance, but is influenced by some obscure invisible contrivance to perform its Motions, in the same manner as our bodies are not operated upon solely by mechanical principles, but owe their action to a different power. In order to prove this more clearly, let us premise that the contrary opinion has been owing to an error, that unavoidably has crept into a philosophy, so mechanical as ours has been.

WE

WE have been too apt to think that the action of material substances upon one another hath been always in proportion to the resistance that is given, or that the power of moving of bodies is determined by their density. This is true in general, with regard to most kinds of Matter in their natural state, and as they are offered to our observation ; but it is by no means an universal principle ; the action of winds, the action of common elastic air, and the action of vapours, may be excluded from this general rule. Sir Isaac Newton himself, who made such notable discoveries, with regard to the powers of Attraction and Gravitation ; yet entertained many conjectures concerning the means by which they took place, or by which bodies first began to move. But what he imagined, could never admit of mechanical reasoning, and upon this account was not admitted as just. It was not however less true for that reason. It was beyond the enquiry of mathematics, and experiment was the only test

test of its truth. More modern philosophers, who have taken up the study in this train, may have made great discoveries in this particular. We shall attempt no more then, than by detailing their sentiments, to elucidate this point ; which we hope to do without injuring the importance of genuine reasoning, or invalidating the real nature of the truth*.

* In the whole of this we must acknowledge the merit that is due to so ingenious a professor as Doctor Cullen of Edinburgh, who in his chemical lectures has thrown such admirable lights upon this subject. And we must always sincerely wish that his discourses on the Matter of Fire were made public, not only as a piece of instruction, which the good of mankind demands from him, but as a confirmation of our sentiments.

S E C T. III.

Of the more minute principles by which the Law of Repulsion takes place, the Ether of Sir Isaac Newton, and the Matter of Fire.

WE have already seen, that of all the Laws of Nature, Repulsion is that which most universally prevails; when the parts of Matter are brought into peculiar circumstances and influenced by a particular affection, viz. that of Fire or Heat. But we may now go a little further, and advance that all bodies, even in the natural state in which we find them, are always influenced by the same rule, that Repulsion is the original state of Nature, and that the laws of Gravitation and Attraction are dependent upon it. We advanced very boldly when we alledged that Matter did not act as Matter or according to its density; but then we had not considered this principle

as universal; but if that can be confirmed, then it will want no proof, that the action of bodies depends not upon their density. There can be nothing more simple than the action of the air, and yet nothing more evident, than that this does not depend upon the quantity of Matter contained in it; for one bubble of this element compressed in the condensing engine will equally resist the force that is made upon it, as what would fill an immense space. The same may be said of vapour, if an engine could be contrived so close, as not to admit the least bubble to escape from it. It is the spring, the elastic and repelling force, that must occasion this vast power and effect, which seem so exceeding strange and wonderful. If we suppose bodies to act by their density, this repellent state can never take place; for by their density must be understood the quantity of Matter contained in them; and, on the contrary, if we imagine that this state of Repulsion is universal, then bodies can never act by their density,

density, or the quantity of Matter. This is not intended to destroy those notions that are so universally approved of, with regard to the moving powers of bodies ; because I think they may be explained from another principle, and because it is irrational to conclude that bodies begin to act just in the manner in which we see them. We are not disputing about the mere action itself, but about the first motions which take place in Matter. Sir Isaac Newton, as we observed before, was hardly content with the mathematical reasonings upon Gravitation and Attraction ; nor could he be brought to think that they were primary actions, but he sought for something further, to give rise to these motions. He imagined that there was a subtile Ether, or Medium which not only *pervaded* but *surrounded* all bodies, and that it was by means of this that all their motions were originally set forward. This conjecture was certainly the effect of just reasoning, and argued as much the elegance of his genius ; as his other discoveries

coveries display the soundness of his judgment. There is nothing inconsistent in this supposition of an Ether, by which bodies are primarily induced to action. It may admit of a very probable conjecture, not only from the visible effects that are produced, but from the analogy of human nature. We cannot immediately act upon our bodies, though we possess a spiritual agent, but all our actions are brought about by a medium between our souls, and the more corporeal parts of our nature. Why should not then superior agents, as they possess the same power, require some such means to execute their purpose. And this is so far from depreciating their nature, that it highly exalts it, by giving the greater simplicity to their motions. But prior to this consideration, let us endeavour to demonstrate the existence of such an Ether, and prove its influence upon material substances.

WE have already seen that all bodies are capable of being brought into a state of Repulsion, and that this is effected by the influence of Fire. Let us then examine into the nature of the matter of Fire, and see if it is not capable, by the power which it enjoys, of becoming a proper medium between bodies, and answering to all the properties of the universal Ether. This element has always been observed with wonder and astonishment, from the first ages of the world. The ignorant adored it as an emanation of Divinity, and philosophy made it a principle in the constitution of the universe. But it is the latter ages of philosophy, that have paid the greatest attention to it, and enhanced its value. And this has been, not because they always considered it aright, but because they deviated from former rules, opened a door to further consideration, and gave a scope to a general enquiry.

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BOERHAAVE was the first perhaps who reduced it to a system, and his sentiments are now the most universally prevailing. But his enquiry was only upon the verge, and he took notice of it only in its external form. Thus he resolved it into a mere affection, or circumstance of Matter, occasioned by an intestine motion that might arise in the different parts of it; from which he further adduced this proposition, that it arose in proportion to the density of the bodies in which it was excited. All this is indeed fact, that from motion heat must necessarily arise or be generated, and that the greater the density of any body is, the more motion will be occasioned, and of consequence greater heat. But then, abstracted from the body this is nothing, and it is inconsistent to make such an affection or circumstance of bodies capable of affecting us like a substance. How inconceivable is this to the common capacities of mankind. If we are hurt or injured by
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this element, when not in contact with any body, we can hardly ever dispose ourselves to think, that this is owing to the intestine motion of a body at a distance from us ; but we much more easily conclude, and indeed always imagine, that it is some substance that affects us.

BUT besides this, it is evident to our senses, that there is something flowing from these bodies on fire, that pervades others, alters their properties, and reduces them to a different form. Two bodies shall be put together, neither of which are the least affected with heat; this affection shall immediately arise between them, and they shall be changed into a new substance*. The heat that is already generated in a body, as in charcoal, shall be applied to

* This is the cause too of all fermentable substances in which Heat is spontaneously generated, they are changed into a body different in its properties to every appearance, and in its effects upon the human system.

another, as a metallic ore, and that shall be changed into a third as unlike the former as any two that can be imagined†. Can mere Motion affect all this, without the aid of any substance? I should think not: But let it be granted to be so; and then I would ask, what gave rise to this Motion, for it must certainly arise from something. If it be said that it arises from heat, then heat is a body, or else it is the Motion itself which is the cause of its own Motion. Besides, if heat is only a quality, we may observe then that a quality can give Motion; and if it can give Motion, why not the Motion of the universe. To what a dangerous precipice will such reasoning as this bring us; and what room will it give a Sceptic to glory in his principles, when

† The ores of metals are very different from the metal itself; as having no malleability, the grand property of these substances. This is given to them by interposing layers of charcoal, which when set on fire, yield some unknown substance which gives this property.

when we ourselves reduce the whole existence of substances to a quality or mere affection.

IT is the most probable opinion, that there is a Matter or Substance in Fire, and that Motion is no more than the form by which it appears, and is made evident to our senses, and by which it is enabled to act upon other parts of Matter. If then it is granted to be a substance, it must be the most active and the most subtile of any we are acquainted with; and it must be universal and exist in all bodies, because they are all capable of having it evolved from them. Notwithstanding this, it must be considered as simple, inoffensive and innocent, except when roused to act, and then it becomes the most violent and repulsive. Nothing can withstand its influence or allay its force.

WE have found then a Matter universal in all bodies, which is constantly repellent,

and disposed to exercise this power; but which is most commonly kept down and restrained from action, and that whenever we see it, in consequence of this, it is furious and outrageous. But we must now in some measure lose the last idea of it, and consider it only as universally active. By this means, we hope we shall in some manner, be able to account for many of the phænomena of nature from its influence.

S E C T. IV.

*Of the means by which this Principle may act
in influencing Gravitation, &c.*

WE shall begin with accounting for the general Principle of Attraction, from this universal repellent active Matter which we discover in nature. Attraction, we have already intimated, is an apparent tendency that bodies have to approach each other

other and become conjoined. This can take place no otherwise than by a force exerted upon them *ab extra*, or an internal principle in their own nature. If we appeal to the decree of our common conceptions of things, the former will certainly appear more natural and easy than the latter. But not to trust to a decision that may be built upon fancy, and exclude just reasoning, let us try it by the test of philosophy.

IN order to prove the possibility of it, we must beg the favour of this supposition; that the whole universe is full of a repellent Matter, or that any particular part is completely filled with it, and the connection with any other is entirely stopped. Suppose then, that this repellent Matter, by any force or energy exerted upon it, or by being let loose from its hold, is excited to Motion. If this Motion was universal, all the repellent Matter would be excited to this affection, and be driven in the same

direction *ad infinitum*. But if it met with any resistance from inactive bodies, or those that were moved had not a power to communicate to others the same degree of Motion, all which circumstances must necessarily happen in the state in which we have placed it; then that part of Matter which moved towards the other part, which is passive, would seem to be attracted by it; but in reality would be only driven towards the other with a force too great for it to repel or drive back. Let us suppose, for example, a series of spherical bodies all repelling each other, and whose original force of Repulsion, when put into action, would be the same; one of these bodies is set in Motion with double of its original power, and the other acting against it but with half that force, cannot repel, but must submit to its influence, and in this case, seem to attract it towards it: So that here the repellent Matter itself would become passive, inactive and attractive, where it did not acknowledge the immediate agency of

some higher cause. And thus we see, that although bodies may be said to be always in a state in which they may repel each other, yet when a superior force of Repulsion acts upon them, then they put on the form of an Attraction. The same reasoning will hold good not only with regard to their producing a simple Attraction, but likewise in order to keep them in that state of adherence and contact, which would otherwise seem to be a confirmation of that power.

BUT to be more particular, let us now endeavour to explain some of the particular Attractions, that may be observed in nature, and of which we have already taken some degree of notice.

AND first, let us consider the Law of Gravitation, and see if this cannot be explained from the foregoing principles: A body is let fall from my hand, and it immediately approaches the earth; this body

is possessed of a great quantity of repelling Matter, both in its substance and in what continually surrounds it. This Matter is put into an intestine Motion by my hand, and although that action is so small as can scarce be perceived, yet we have no notion how inconsiderable a force is required to excite the power of this repelling substance. The body thus put in motion, overcomes entirely the repelling force of the air, and thus falls down to the ground, and puts on the appearance of an Attraction to the earth*.

The Attraction of Cohesion and Adhesion may be explained in the same manner. The most simple of this kind is that of Capillary Tubes, in which fluids pursue a course directly contrary to their gravity, and are attracted to a body to which they have
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* Perhaps this sentiment will admit of some degree of confirmation from the doctrine of Pendulums; where the force of Attraction does not immediately take place, but is determined by the force of vibration excited in the body,

no relation. This may be explained in a very simple manner, from this doctrine of a repelling Matter: For if we can suppose its existence at all, it must be in its greatest perfection where it is most divided, and divested of what is merely material: And there it is that this law does most evidently take place. In this instance it must not be considered, even as an apparent Attraction in the tubes of Glafs, but rather as an example of the free exercise of Repulsion in the Matter contained in them. Fluids are infinitely more subtile than Solids, and Water is the most so of any of them that we know; so that it is no wonder it should seem most evident in that substance.

I need not mention the peculiar Attractions which seem to be made from choice, by particular bodies with each other. For they not only evince this fact in the highest degree, but are very perfect instances, upon which we might rationally form the idea. It would be too tedious to
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enter into a particular discussion of them, neither is the present philosophy mature enough to deduce the consequence from it, but in all the affections of this kind we see a very active Matter produced, and perhaps determining all these effects.

THESE observations will more particularly agree with those phænomena, that have been observed in Magnetism and Electricity. The laws that take place in bodies affected by them, are quite different from the common ones, that are attributed to Matter, although they have never been reduced to any just or even plausible theory. The whole of what we have advanced, is only an illustration taken from them. For in these we see the circumstances as we have taken notice of, more fully and clearly elucidated. A Repulsion and Attraction independent of Matter or the laws of it; arising from some obscure unintelligible cause, and adapting themselves to peculiar parts rather than the general forms of material substances.

stances. If that subject was more enlightened than it is, ours perhaps might carry with it more the appearance of truth. We hope therefore that it is daily approaching to a crisis ; and then, that what we have advanced only as conjecture, may stand upon a firm and stable foundation.

S E C T. V.

Of the final Cause of a general repulsive Principle in Matter.

WE have not, without some degree of justice, complained of the deficiency of experiments, to ascertain a truth of such infinite importance : We must beg leave therefore to appeal to another quarter, for arguments to support it ; and although any thing of metaphysics may be so much decried in determining facts, yet we hope in this case to derive some satisfaction from that source. To enquire into the final
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cause of this repulsive power, to examine more particularly into the scheme of Providence as it presides over Matter, and what is more properly our business in this affair, to explain how it produces the great revolutions of the universe; have sufficient motives in themselves to induce us to this disquisition. The more simple the ways of Providence or any spiritual Beings are conceived, the higher it proclaims their qualities, and carries the greater degree of probability. No one will pretend to deny, but that there certainly must be the greatest simplicity in the works of God, although we are not always so happy as to discover it; and notwithstanding in our researches after truth, we find them connected with a very complex system, involved in many hidden and mysterious circumstances, and often independent of any foreseen cause, yet, the mind of man always labours at simplicity, and the more clear and plausible a system it can establish upon this foundation, the more easily it satisfies itself, and obtains the approbation

probation of the rest of mankind. The great excellency of Sir Isaac Newton lay in this particular, and if he could have proved his conjectures as satisfactorily as he did his mathematical truths, he would have rendered his discoveries infinitely more perfect than they were; and they would as much more have exceeded what he did discover, as that excelled the previous knowledge of mankind.

MANY authors, and even his own disciples since his day, have either neglected the conjectures at the end of his optics, or have objected to them as frivolous and of no use, or have even taken the pains to support a mathematical reasoning against them. For they say, it is only extending the step of an infinite problem a little further, which at last must terminate in one point, viz. the infinite power of *God Almighty*. I must beg leave to differ from these gentlemen, as I cannot see the force of their objection. For if this philosopher could have pursued his researches a little further,
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they would not only have carried on the problem, but would have enforced the power of one simple, general, stated rule, whereas, as the case stood, he was obliged to admit of several distinct from each other ; operating not only independently, but also in opposite directions. This was not only true, as it respected the fact, but the mind also tending to discover something more, must be dissatisfied with itself, and thus make his system appear less perfect even to his own judgment.

BUT besides, from laws so opposite to each other as those were conceived, it was not easy to suppose the immediate Action of the Deity upon Matter. It might be thought derogatory to his perfections, that he should constantly intermingle himself with human affairs ; and condescend to transact such minute and trifling actions, as we see brought about upon by the force of Gravity and Attraction. From this it was that this notion was established ; that
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stated invariable rules were instituted at the creation, by which these laws took place of themselves, and were not induced, by the immediate hand of Providence. We hope we have already shewn that his Presence is necessary to every exertion of his power, or otherwise that Matter must act of itself. From hence then this opinion will naturally flow, that the most probable means, by which he exerts that power, must be those which we imagine the most simple, and by which his action can most easily be enforced. This will very probably be acknowledged to be in that manner, which we have already described. That the universe is full of an etherial substance, by which, as a Medium, every revolution of Matter may be conveyed to the supreme Mind, and every action of the universe be performed: That this pervades and surrounds all bodies, and that all the circumstances of their particular nature are brought about by the agitations of this repulsive Matter,

Matter, induced to motion by some spiritual Agent.

THESE sentiments will admit of a further proof, if we draw an analogy between these Motions, and the common actions of animal beings. We see in them, a particular form and construction necessary to every action that they obtain. We see likewise a peculiar general mode established for their Action, to which all mechanical ends are made subservient, viz. by impelling from the center of Motion. We may observe likewise a means inadequate to a mechanical end, in the nervous system, by which every Motion is brought about, whenever the mind chuses to act. Let us now endeavour to form the analogy between these Motions and the great Laws of Nature.

THE first instance indeed will hardly bear any comparison. We do not see the Motions of Matter much dependent upon
form,

form, or peculiar construction of parts. But this perhaps is owing to a defect in our own senses, we have not the means to discover what variety of forms may be in heavenly bodies, which shall adapt them to Motions different from what we see Matter influenced by here on earth. There is one instance in which we may see an apparent diversity, not in the law indeed, but in the method by which it is brought about, and that is in the revolution of Comets. The circulation of such a body, and that of a Planet may owe their difference, perhaps, to circumstances of form, as much as that of the sap of vegetable and the blood of animal bodies. In this, however, a difference must be taken notice of, which destroys entirely all analogy. Animated bodies, as they differ in structure, differ in the mind that superintends them; but the laws of Matter most probably are influenced by one mind, and one agent that directs all their Actions.

BUT we pursue the analogy to the second instance, viz. the Mode or Form by which muscular Motion and the Motions of Matter are performed. The former, as we have said, is by an impelling or repelling Power from the center of Motion, by which as the *primum mobile*, it directs all its other Motions, as casting bodies from it in every direction, and likewise drawing them to, and attracting them towards it. The latter is influenced too, much in the same way; for the laws of Gravitation and Attraction, as we have before observed, may be, and hence it is easy to infer, that they are operated upon, originally by a repulsive principle of Matter.

BUT the analogy will perhaps be the most conspicuous in the third instance that we mentioned, viz. in the means by which Motion is originally begun in the Matter that is first acted upon by Spirit. This is the nervous power of Animals in one case, and the Ether of Sir Isaac Newton

ton in the other; both of which, if considered in a mechanical view, are entirely inadequate to the end proposed. This indeed has favoured the objections of mechanical reasoners against the influence of the Etherial substance. But I think the analogy between these substances is so strong, that it is a very great confirmation of the fact, without the assistance of mathematics. Whether an Ether of this kind prevails in animal bodies has been a doubt made by some; how far this is true, we shall not examine at present, but hasten to observe: That it will strengthen very much our notions, concerning the influence of a spiritual substance in the Motions of Matter: And that as a perpetual agency, which directs and governs every Action in the one, is absolutely necessary to its existence, so we may infer that the same relation is no less to be sustained by the same means in the other.

C H A P. III.

Of V E G E T A B L E S.

S E C T. I.

*Of the general distinguishing Marks of this
Class of Beings.*

HAVING delivered our sentiments with regard to the methods, by which the laws of Matter in general are performed ; we shall now proceed to enquire into the Motions of more particular parts, and observe wherein consists the difference, both of the Action itself, and of the Agent or Being which induces it. And first, let us examine a little the vegetable System, and investigate the nature and properties of that Tribe of Beings that
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compose it. Substances indeed, which cannot properly be considered as a middle Life between the general Motions of Matter, and the more truly animated System; but must be viewed in this light, as the first, though lowest of those beings that acknowledge a distinct organization, or are influenced in their Motions by a peculiar construction of parts.

WHATEVER view we take of this subject, we shall find it replete with sufficient Matter to convince us, that the hand of Providence presides and governs likewise in this part of the universe. But then it does not act by such an immediate influence, such a distinct and uninterrupted authority, and by such a sole and undivided agency. A Vegetable must always be considered as a different kind of Matter from that which we have already reviewed. It partakes indeed of all the general properties which that enjoys, and which we have already described. It is possessed of Solidity and Ex-

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tension,

tenſion, thoſe general ſtandards, by which Matter is diſtinguiſhed from Spirit. It acknowledges the influence of Gravity and Attraction, thoſe principles, which we obſerve as common to material bodies. And when viewed in a tranſient manner, merely as an exiſtent body, diſcovers only thoſe properties that every other thing enjoys that ſurrounds us. But if we make a nearer inſpection into it, and review it for ſome time of its paſt exiſtence, we ſhall find that it poſſeſſes many properties, and is to be diſtinguiſhed by many affections, which Matter never can nor has been obſerved in the leaſt degree to partake of.

It muſt from hence then be conſidered as a ſeparate being, and as influenced by different cauſes. We ſhall aſſume the term Life, as the idea that forms this diſtinction between them; and this muſt neceſſarily be founded upon a ſuppoſition, that they are actuated by different ſpiritual Agents, and that the Spirit, which directs the Motions

tions of Matter in general, affects this Class of Beings not in an immediate, but in a secondary manner. The general affections of Matter are so universal, and we are acquainted with so little variety in the general principles from which they proceed, that however they may be influenced, it has never been thought proper to apply, even in imagination, the term of Life to them. The more obvious reason of this seems to be, that we have never been able to observe any revolutions to have happened in them, which destroyed their properties. We view only parts of the system, and though these should fail, yet it is only like the amputation of an animal limb, which takes away Life only from the part affected, but does not destroy that of the whole machine. But this is not the case in the animal and vegetable tribes, where we can perceive the whole of their power and the extent of their existence. These we see at one time acting by certain principles and laws, losing them in a very sudden manner, and becom-

ing devoid of every thing but what we see Matter in general enjoy.

UPON this then there might be ground, perhaps, to establish the distinction between Matter in general and the vegetable constitution. But let us examine the subject a little more particularly, in order to see whether the general principles, by which Matter is governed, are sufficient to explain the different phenomena which may be observed in this Class of Beings. To this end let us first point out some of the particular instances in which they differ from each other.

WE have already seen, that Matter in general, always acts in a particular direction, whenever influenced to Motion, and that is by receding or going forward immediately from the moving power. Thus if we move a ball with our hands, it corresponds to the Motion which we give it, and moves directly forward, until it meet with
resistance

resistance from a passive body which is able to re-act upon it ; or rather to prevent the extent of its Action. But Vegetables have a very different manner of acting, and notwithstanding that we cannot so minutely examine into all the circumstances of their nature, as to find that they always act differently from the general Motions of Matter, yet from analogy with those we are acquainted with, we may presume that their Action is quite in an opposite direction from the impulse ; and that it is most commonly dependent upon a resisting power inherent in themselves, to repel every thing which offers to act upon them,

ANOTHER difference between the Motions of Matter in general, and the vegetable system, may be perceived in this ; that when Motion is excited in Matter, it extends no further than where a connection reigns. An objection indeed may be here alledged, with regard to musical strings, which appear to excite Motions in each other,

other, though at some distance. This at first view, may appear plausible enough, but upon nearer inspection, it will be found, that this is effected entirely by the air, which in such a case must be considered as a medium which supports the connection. The same rule does not hold good with respect to Vegetables, they are often induced to action in parts very distant from where it first began, where no connection subsists between them, and where the air cannot interpose as a Medium in any measure to influence it: So that this Action seems to be absolutely and entirely independent of any material affection, to which we can compare it. The most lively example we can adduce upon this subject is the sensitive Plant, a very beautiful and indeed a very striking instance of the power of vegetable life.

But if we descend to the œconomy of Plants, I mean in their vegetation, &c. we shall find continual instances of their Mo-
tions,

tions, and these not only when affected by Agents, universally acknowledged to act under the influence of a soul, but also when actuated by material substances themselves. This indeed we must consider as a Motion, which a Plant determines for itself, and may have some right to be called spontaneous, and thus makes a third difference between these Actions and those of Matter. We can almost always account from general principles, for those Motions that we see actuating bodies in general, but it is not so in this instance of Plants. It has been much disputed how it is they come to act at all, and that vegetation is performed. Let us enquire a little into this matter; and first, let us determine the facts upon which we shall proceed; the surest guides of truth and infallibility. But this must be the design of the following section.

S E C T. II.

Of Vegetation and the Motions of Plants.

TH E judicious Dr. Hales has thrown perhaps the greatest light upon the subject of Vegetation, of any author who has ever written, in this, or any other country. Grew and Duhamel laid a foundation for this enquiry; one, by an exact Anatomy, and the other, by accurate experiments on the functions of this class of Beings. The whole has contributed to discover the following facts: First, That a continual absorption of a nutritious Matter is constantly performed by a set of vessels fitted and destined for that purpose. Thus by laying a Plant in water for a few days, it has been observed, that the whole of the water shall be drawn off through these vessels in a very expeditious manner, and this much more considerably, than if it had been done by
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the fun, or exhalations by any other means; and yet that the Vegetable itself shall not be by any means sur-charged with it, as would infallibly happen to any material substance, as an absorbent earth, or any thing else that operates in that manner. These substances, act only by their porous texture, which occasions what is called an Attraction of Cohesion, and can operate only on a particular quantity, like Capillary Tubes, which must always emit what they cannot bear to attract. But it is very different in Vegetables, for they not only continue to imbibe a very large quantity, but, secondly, They are nourished, enlarged, and protected by it, parts that are concealed are developed, and the figure is entirely altered, and becomes very different from what it was at its first appearance. This as the end brought about by the other as a means, would be sufficient to convince us of something different from Matter without any other proof; but it will be more clearly and fully elucidated when we
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come to consider, that this is often effected, in the third place, by peculiar kinds of Matter. When we operate with material substances, we find indeed that peculiar sorts are effected to each other, but with regard to the rest are entirely inactive and sluggish. This is what forms the elective Attractions in Matter. We do not find any thing absolutely of this kind in Vegetables; for although they select some particular kinds for their nourishment, yet they are acted upon by all, notwithstanding each produces a different effect. They act too upon these beings in a very different manner, from what they do on Matter in general, not by destroying their properties as in the case of elective Attraction, but by keeping up and preserving those properties entire, whilst they endeavour to throw off the offending cause. All Plants are said to have their peculiar food, which hastens the progress of their vegetation. These they select from different kinds of material substances, but these substances do not contribute

tribute their own nature to them, but like the food of animals only preserve them in their original state. From hence it is, that nothing is more common than this observation; that a poisonous and a wholesome Vegetable shall both be produced from the same soil, and where the same food has contributed to their sustenance. In the fourth place, not only those parts of Matter which constitute the food of Vegetables, and others of that kind, excite Motions; but other bodies likewise, very different from these, contribute very much to promote their vegetation. Of these the Sun by its light and heat, seems to have a very peculiar influence, in so much, that perhaps there is no circumstance that can happen to a Plant, in altering the state and nature of its juices, in prolonging its growth, and keeping up the vital powers, which can be more favourable to it, than this luminary. This will be clear to every one's conceptions, if we consider the great variety of Plants, which different climates afford over
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the face of the globe ; where the greatest diversities, unknown to each other, are raised and supported. This is not only the case, but there are an infinite number of Plants, which after all the pains that can possibly be taken by soil and cultivation, yet wanting the power of the Sun, will fade and die very quickly in a climate where they are not natives. A peculiar delicacy in this respect may be observed in Plants to determine something very nice and particular in their Motions, from this cause. It is not the quantity of heat alone, it is not merely the exposure to which they are directed, but there are a thousand circumstances besides, which are to be attended to, in order to enable them, to receive all the influence that the rays of the Sun can give them. Besides this, Light itself, without the assistance of Heat, is of the highest consequence in the production of many Vegetables. Dr. Hill has ingeniously shewn the Force of this in his Essay on the Sleep of Plants. But what is more surprising,

prizing, is, that Light in some Plants is destructive of their growth, and they never promote their vegetation so completely as in the dark. Whether Light is independent of Heat, or is only the faintest exercise of that power, produced by an emanation from it, we shall not at present enquire. Thus far is certain, that it is a body, and as such produces a very great alteration in the nature of vegetable juices, where the degree of Heat is exceedingly small, and can produce no perceptible effect. The blanching of many roots, by concealing them from the Light, a very useful discovery in gardening, and the Phænomena of the Passion Flower, are very evident proofs of the truth of this fact. In the fifth place, There is another circumstance in vegetation which evinces a peculiar kind of Motion in Plants different from that of Matter, as much as any other which we have already mentioned. This is the direct opposite to their absorption, viz. a continual perspiration, or exit of moisture

in a very surprizing degree, and this absolutely independent of any liquor that they take into their substance. The numberless and judicious experiments of Dr. Hales, will be standing testimonies to perpetuity, of the truth of this fact. That it is done by Capillary Tubes is inconsistent with true philosophy, however strenuous the advocates of that opinion may be to support it upon this foundation. The surprizing velocity with which a liquor is carried through them, was never executed by mere Matter, though ever so porous. And besides the influence this power has in decreasing the weight of a Plant, the different effects it perceives from Heat and Light, or from a fine or a cloudy day, and the many accidents it is liable to undergo, which obstruct and retard this power, are all convincing proofs, that it is a Motion peculiar to this tribe of beings, and is a distinguishing mark of their constitution. The great effect of Seasons, likewise, in promoting this phænomenon, is sufficiently demonstrated by
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the Vine in the bleeding season, where a considerable quantity of liquid protrudes itself through the Vegetable in great proportion, and with vast velocity, but suddenly stops, and for the remainder of the year admits of no peculiar difference from other Plants. Sixthly, Dr. Hales has confirmed another fact to this purpose, which was before advanced by Grew, viz. that Vegetables transmit through their substance a large quantity of air, and this not in an inactive unelastic state, as it enters many parts of Matter, but as of an highly repellent nature, the same as is carried through the lungs of our bodies by respiration. A Plant is not mere porous Matter, which admits accidentally of this element, but it conveys it through its system as of consequence to its vegetation. For this purpose, a peculiar set of vessels are destined, which may easily be exhibited to the eye, and the existence of the fluid is evident to the test of experiment. In the seventh place, we are to take notice of

a very peculiar Action of Plants, to elucidate this point, which may tend to shew the distinction upon which we insist, more particularly than any other we have mentioned, as it may be considered much more entirely spontaneous, and independent of any external cause ; I mean the generation, or propagation of the distinct species of this set of beings. This is a fact which has indeed been very much disputed. Linnæus, the most eminent professor of modern Botany, has adopted the opinion in its fullest extent, and founded his system upon the parts subservient to this mode of Action. It has been happy for the advocates of this fact, that all Plants have not been hermaphrodite. For in that case, the distinction could not easily have been demonstrated, but the sterility of a Plant of the same species, which was discovered to be a female, as was the case with the Palm Tree, at the Cape of Good Hope, and many others where the male has been absent, seem in some measure to evince that this doctrine

doctrine is not entirely fallacious. But besides that immediate connection between two distinct Plants, as is necessary here, the many contrivances which the seed itself exercises to promote its existence, the continual growth of it to a large and flourishing tree, the annual dropping of several parts at the approach of winter, and the revival and development of them the ensuing spring; are evidences of a very great seemingly spontaneous power in these beings, and such as mere Matter is entirely unacquainted with.

HAVING shewn, that there really exists a Motion in Vegetables, distinct from that general one, which directs and influences mere Matter; let us try if we can determine, what it is that constitutes this difference between them. We must seek for the origin of it, from the causes which we may observe to bring about the Action, the motives upon which it is performed, and the means which are employed to effect it.

I. WE have seen that Matter is influenced by a general cause; but whether it is the Deity who superintends the universe, or some delegate which he has deputed, to actuate this system, we have not pretended absolutely to determine. The ways of the Almighty are inscrutable and past finding out. But so far as this, we are almost certain, that all the Motions of this world, or of Matter in general, are parts of one system, established upon certain invariable rules which want no other Motions to complete it. The cause or mind, which is employed in directing and presiding over this system, confines itself to those rules or methods of acting; and from them alone we can determine its presence and government. But from various and different Actions appropriated as it were to another system, and from the laws by which they are influenced, we have reviewed a set of beings in some measure acting counter to the general laws of Matter. We are already prepossessed
with

with the idea, that distinct beings may subsist in nature independently of each other, and that the only means of discovering their individuality is by a review of their peculiar Actions. From these circumstances then it will be easy to infer, that there is a distinct cause of Action in Vegetables. And as we see every Plant forming in itself a distinct system, and although acting by the same rules, yet peculiar in the time and circumstances of its Action, and determined by no general cause; we may presume to think, that each individual has an agent or cause, particular to itself, to direct and govern its Actions.

2. LET us consider the Motives upon which these Actions are performed. All the Actions of spiritual Beings must proceed from and be directed by some Motive. There must be some impression made upon them, either from the suggestions of some rational intelligent Powers, or an affection received from some external circumstance. All the Actions of that Being, who actu-

ates the universe, no doubt are influenced by the former of these motives. Many of the actions of human creatures, perhaps all those of mere animal machines, acknowledge the latter. If we consider very exactly the original Actions of mankind, we may find that these are the only motives by which sublunary beings are instigated to Action ; and if we examine all the active natures in the universe, we may discover that the Actions of Plants too are of this kind. We can raise these beings no higher, and if they have any Action at all, it must proceed from this motive, viz. some external impressions made upon their substance, and in consequence of this, inducing a reciprocal Action.

3. LET us proceed to examine, the means which are employed, to effect the Actions of Vegetables. We have endeavoured to shew that the general laws of Matter, are resolvable into one more simple principle, and that this takes place only by means of one particular kind of Matter, viz. the Ether

of Sir Isaac Newton, independently of any particular formation. Whether such an Ether as this pervades the constitution of Vegetables, and is the spring of their existence, is very uncertain. Yet that something of a repelling power actuates their Motions is evident. But there is something more required to enable them to perform all those which we may observe them undergo. This is a peculiar structure and organization of parts, a distinct system of vessels adapted to transmit fluids through their inmost nature, a distinct method of receiving the impressions of external Matter, and distinct powers of re-acting upon, and bringing about the various changes we may perceive in them. This mechanism is so far from favouring perfection in these bodies, that it is certainly highly derogatory to their nature. The Actions which arise from pure spirit, require no organs, the universe itself performs an office, which in other beings is limited and confined.

It is not only structure and organization which are necessary to convince us of the distinction, between the Actions of Vegetables, and those of Matter in general; but there is a great difference with regard to their method of Action upon particular substances that offer impressions to them. Many parts of Matter act upon others, but in this Action they corrode and destroy them; but where they act upon Vegetables, they may be made the means of their greater perfection. The weight or density of bodies likewise, have a peculiar influence in the general Actions of Matter, and upon them the mechanical laws are founded. But they have no power over the vegetable system. Bodies, which make an impression on it, must be endued with some degree of stimulus, or a power which makes them peculiarly active, with regard to that constitution, independently of mechanism or any of its laws.

WE hope then, we have in some measure, proved from the foregoing, that a Plant or Vegetable constitutes a distinct species of beings, performing various Motions of which Matter is incapable, influenced by different causes, acting upon different motives, and performing Motions by a peculiar and distinct means. But there are many circumstances, besides what have been mentioned, which may contribute to support this truth, particularly one, which can escape no observation. I mean its being fixed to the ground, from which, if you remove it, you destroy its existence.

AN objection may be raised against what we have advanced, upon this foundation; that perception is not distinguishable in this tribe of beings, and yet that our notions require such a faculty. It must be confessed, that this throws a great difficulty in our way, and which is not easily to be surmounted. In answer to it, we alledge

that there certainly is in Vegetables a power by which they are raised from seed, and nourished and protected during their existence; and when by any unforeseen causes, this power shall desert them, they fade away and die. Since then, by this power, all these Actions are performed, I should be glad to know why we cannot understand that perception is necessary to it. If by perception, indeed, is meant consciousness, it will be difficult to shew the existence of such a faculty; but we hope, hereafter to shew that consciousness is not necessary to every exertion of mental powers. We shall therefore give a softer term to this faculty in Plants, and call it Irritation, which signifies no more than a capacity of receiving impressions from other parts of Matter, and in consequence of that, inducing an Action in their own system. By this indeed, and in every fact which is known in Vegetation, they very nearly resemble animal nature. This analogy has been thought so strong and apparent, that Naturalists

turalists have been in doubt where to limit the distinction between the two systems. The espousers of each have supposed the existence of many species in either tribe to belong to their favourite ; and every age of the world, has presented to us different divisions of these beings.

It is the pride of mankind, which endeavours to exalt its own nature, and screen itself from that impotency, which this class seems to possess, which could ever suggest a distinction, further than the particular qualities of individuals would enforce. But I can see no reason why I may not be ranked with that tribe of beings which includes a Rose, as with that which contains an Oyster, or that simple being a Polypus. The only proper and most natural limits of distinction which can be made in the works of nature, are where the first dawns of life appear, where we can form an absolute difference, and where gradation of power in themselves does not subsist. Mere Matter is
absolutely

absolutely different from any Vegetable. No structure of peculiar parts, no organization, no simple animating power can be perceived, or even imagined in any parts of it. Here then it is necessary to set down the limits of distinction ; where general Actions cease, and where particular begin. This distinction is not founded merely upon ideal notions which can possibly be controverted, but carries with it the highest degree of security against cavil. Gradation can only be admitted in beings of the same nature in some respects, but not in those which entirely differ from each other. In this case then, I see no reason why we may not include Vegetables in the class of Animals. They are all living acting beings, and influenced by causes which are peculiar to each individual. They are all supposed to have in themselves one sensitive principle, and are indifferent to the Action of any other, except where their own is concerned and interested.

WE have in this sketch, we hope then, partly investigated the nature of that life which is apparent in the Vegetable constitution; we have shewn those Actions in which they differ from Matter in general; and we have, in some measure, ascertained the causes which over-rule and direct their Motions. Let us now ascend a little higher and to a more important subject, examine into the nature of a scale of beings, whose utility is so evident in the world, and explain how it is that the animal world is instigated to Action, and to the performance of the various Motions we may observe continually going on in their system.

C H A P. IV.

Of ANIMALS and their MOTIONS
in General.

S E C T. I.

Of the Dignity of Human Nature.

THERE is no consideration so important as this: Intelligence and Reason, though perhaps gifts, which all Animals possess, yet are very justly acknowledged to be predominant in one part of that tribe. It is certainly from Gradation, that the distinction of Animals from each other arises; but it is a Gradation of mental, not of bodily faculties, which distinguishes *Man* so much above every other species. It is a vain and proud, as
well

well as inconsistent idea, that should imagine the forms of our bodies, superior to those of Brutes; but there is certainly a distinction, to be derived from the understanding, which no one can cavil or subvert. The utility of this consideration, together with the importance of the preservation of human bodies, hath induced us to make that species of beings, the object of a particular review. Indeed, as it may be for their entertainment, so it is likewise for their benefit that these thoughts are digested together. If the major part then, of this Treatise relates to their advantage, we hope it will be no loss to the world. And that which we have already treated, must be considered only as a prelude to what we are now to advance, and designed to support by analogy, the extensive power of a mental faculty, rather than as a settled discourse upon the objects of Enquiry.

IT is a self-sufficient, if not a mean and ungenerous idea of the Creator of the

universe, to think we are so perfect as distinct beings, as we imagine ourselves to be ; as if the Deity intended the advantage of no other beings but ourselves in the creation of the universe ; and as if all Nature was spread out with so bountiful, and unlimited a hand, for the sole benefit of a Creature, who employs his best faculties to disobey him ; and as if every other being was designed to contribute to our welfare, without partaking of any of our faculties, or enjoying any part of our happiness. It is presumption to declare the extent of the latter, it is unjust to pronounce any being devoid of the former. But Man, sufficiently dignified by the infinite powers of his own understanding, is not content with thinking of his Nature as it truly is, but arrogates to himself abilities superior to those of Angels, and depreciates those of other creatures to the lowest degree of infamy. Notwithstanding this however, he possesses a body equally imperfect, with any of those creatures which he despises, and

a mind which tends rather to destroy than promote the existence of his corporeal nature ; so that if the Immortality of his Soul had never been revealed to him, he might have lamented his lot, as that of a very imperfect and infallible creature, rather than encouraged the idea of any great excellence or perfection. It is our business in some measure to consider both the parts that mankind possess, their Mental and their Bodily Faculties. The connection they have with each other, the influence they enjoy in a reciprocal Action, and the necessary dependance by which they are supported, are well worth our enquiry ; but these must be the subject of the following section.

S E C T. II.

Of the Connection between the Mind and the Body.

THE first, as well as the most easy and natural view, which we can take of an Animal Machine, is, that by which we consider it as a compound frame. In this view, it will be found to consist of a sensible intelligent Agent, and an inactive lifeless Matter. We need not insist here upon any of those distinctions, which we demonstrated to make the difference between the Actions of Vegetables and those of common Matter. We have sufficient evidence in our own minds, to convince us, that the animal Body has a more particular power than that substance, that there is a distinct being which always operates upon it, and that it is sensible of various external impressions, by which it is induced to a reciprocal Action.

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THIS noble faculty, which all Animals perhaps in some measure enjoy, but which is more particularly evident in the human constitution, has been distinguished by the appellation of the Mind. A faculty which raises us to the highest degree of excellence; and this, because it is not only, the simple director of human Actions, when immediately instigated by external motives, but because it can imbibe ideas from these objects, which shall retain a future efficacy, because it can revolve them over at pleasure, form accurate judgments of what hereafter may happen, and suit its Action to the various circumstances and appearances of things. In this view it is, that Philosophers have most commonly considered its powers and abilities; as influencing our wills and directing our moral conduct. Here indeed it exhibits its influence in its fullest extent, and where it can never be disputed. Our intention, will be rather to wave a consideration so evident, and to

attend more to what is not so conspicuous. In this we hope to evince, that the whole power of the Mind is not taken up with these Motions alone, but that every Action which we observe to be performed by the human Body, as well as those that depend upon the will, are produced by a part of that general faculty, and a mental cause.

THIS has been very much disputed by many Physicians; either those who have adopted the principles of the mechanical school, or have appropriated some peculiar material cause, to perform many Actions of the system. In our Enquiry, we shall begin with those Actions which are most simple, afterwards consider those that are more complex, and then examine the particulars in which they all agree, and see if they will not all become subservient to our notions concerning them. But first, it is necessary, we should explain more particularly, what we mean by *Mind*. We have already seen, that the general laws of Matter are immediately

diately influenced by a spiritual immaterial Cause, and that without this power or energy, no Action can possibly be induced upon it. We have seen likewise, that a particular spiritual Agent, in some measure resembling that which acts upon Matter, actuates the vegetable Tribe, a species of beings much inferior to that of Animals. The higher power of Animals likewise, we know, must acknowledge such a Being: We must either then allow of another Agent, for the lower Actions we observe in Animals, and thus admit of two agents to one machine, or we must take it for granted, that the human Mind, in its full extent, is not incapable of these inferior Motions. The Mind then, we presume to be no more, than that spiritual Agent which influences all the Actions which the human Body produces; that it begins with the lowest, and ends with the highest, which we see performed by it. It is not fit, however, that this should rest upon a mere as-

sertion. It requires a farther proof. This we shall endeavour to deliver as faithfully and as candidly as we can, in the following Treatise.

S E C T. III.

*Of the Organization of the Animal Body.
Its most simple Actions or IRRITATIONS.*

THE animal Body is a very curious and a very complex machine, calculated in every Motion for receiving impressions from external Bodies, and for reacting again upon them, in consequence of their Action. By this, not only those things that are injurious to the constitution, are repelled from it, but many æconomical functions are performed. But the whole is effected by one particular system, that exists in our Bodies, and extends through the whole of them. This is the nervous power, which

which can almost be demonstrated, or at least supposed, where-ever any Action of the human Body is performed. This is the organization or peculiar structure, to which we must appeal upon every occasion. But what this organization is, whether it be a fluid that by certain fluctuations in its own substance produces these effects, or whether it be the vibration of cords, like musical strings, we shall not at present enquire. We shall only presume to think, that whatever it be, it is surprizingly active, and may be compared to that ethereal substance, which we have imagined to be prevalent in the general Laws of Matter. This may be supported not only from analogy of their mode of Action, but from the Heat of animal Bodies, which cannot possibly be raised by any mechanical powers, but depends upon some obscure and unaccountable cause. We have seen that Heat in Bodies in general, is determined by a substance of this nature, why then should we not seek for the origin of it in our Bodies

dies from the same principle. And if this reign (as it doth) in the animal Body, why should it not be directed by the only active power, that we have, the nervous influence. We shall not endeavour to determine, whether this power be extended to the whole system, or confined to one particular part, viz. the Brain as the head of the system from which it flows. It will be sufficient for us to shew, that the Body organized in this manner is capable of receiving impressions; for it may not be an absolute, but rather a collateral proof, that where this organization reigns, thence the mind's power is to be deduced. This however has been supposed by many learned persons, but we hope to bring a proof from other circumstances, and further evince a truth of such utility to mankind. In consequence of this structure, which we have already mentioned, the animal Body is capable of receiving impressions, and of having Motions excited in consequence, from almost all parts of Matter; and there are
hardly

hardly any that can be applied to it, but what affect it in some measure or other.

THE most simple Action which we shall consider of the human Body will be, that where the least Motion is perceived, upon the access of some other substance. Such a Motion as this is not confined to a living acting Body, but may be observed sometime after death has taken place. In the living Body however, it is very evident to circumspection. A part of Matter, such as any acrid substance for example, is applied to an animal fibre, and immediately the Action, not only of that fibre itself, but of many others in vicinity and conjunction to it, will take place. This very simple Motion may be, and has been called a *Contraction*; but this term relates only to the disposition of the fibres, as they are perceived by us, viz. as they are shortened in their lengths. But it does not refer at all to the cause, which occasioned it, or explain how it is effected. We shall endeavour

vour to ascertain the principles upon which it proceeds, and give a term more fuitable to the nature of its Actions.

THERE are in all material substances, besides their mechanical properties, certain others which are called particular, by which they are excited to act upon others, by a degree of Attraction, or rather mutual Repulsion, that is established between them. By these principles, Bodies become almost always active, they corrode and destroy more inert Matter when acting with violence, they excite considerable vibrations in the vegetable system by which their œconomy is preserved, and by them the most simple Action of Animals is induced. From these effects then upon the animal Body, when applied to it, they have obtained the name of *Stimuli*; which term is given to them from that power of exciting contractions. These stimulating Bodies then may be said to be the remote causes of these Actions; but they do not act as
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upon Matter, by a mere simple Attraction *. It is necessary a more proximate cause should be present, to give that Action of the Fibre that we see follow in consequence. This we are to seek for in the animal Constitution, which is so established as that this effect shall be produced. We have already seen in the vegetable System, that all the affections of that Body are brought about by some internal principle. This must certainly be the case here, the Stimulus is a substance that disagrees with the animal Body, the agent or mind becomes acquainted with its pernicious quality, and hence it is implanted with a power to throw it off. An universal principle from this we may see then established, by which, our spiritual power is engaged to attend to every thing of this kind, and to raise these Contractions by way of expelling them from

* If this was effected by a mere simple Attraction, the animal Fibre must be dissolved, and the stimulating Matter become part of the constitution; which common observation assures us is never the case.

from those Fibres, which they tend to destroy. A very just and good motive, we may also observe in these Actions, viz. of repelling every thing that is injurious. All Stimuli tend to destroy, and although they are necessary, to the protection and nourishment of every species of Animals, yet they contribute to this only as vehicles; for as they are the most simple means of exciting Actions, the animal œconomy could not be supported without their assistance. This will be shewn hereafter; let us, at present, endeavour to distinguish these Actions, by a term that is applicable to the means, by which they are brought about. I think the most proper name to be given to these Contractions or Motions in the animal Fibre, is *Irritation*. And the reason of this, is, because it implies a concurrence of the Mind with the action of the Stimulus, and includes both their Motions. The Fibre likewise that is affected in the manner we have mentioned, may be said to be irritated; and this disposition

position it has to Contraction, is the proper idea of Irritability.

FROM what we have already seen, then we may observe that where we see such simple Actions, produced in our system, as we have taken notice of; we may determine that some degree of Stimulus is necessary to excite that affection, and that this Body can act only in the manner which we have described. The very ingenious and learned Dr. Haller has endeavoured to prove, that the Irritation of the Fibres of Animals, is not an effect produced by an immaterial substance, but that it depends on an elastic Gluten, interposed between the most minute parts of the Body, which induces this simple Action by a mere mechanical power. But if this Action be dependent upon the force of Stimuli, in the manner we have described; I should inquire how it is that Stimuli are affected to this peculiar substance, and how they are prevented from actually destroying of an
Animal

Animal, rather than promoting any Action in its constitution. An acrid Substance applied to any part of an Animal, when deprived of its vital powers, has this effect; but when it acts upon it in full vigour and activity, the former Action I mentioned may be observed. There is something then which a living Animal enjoys, superior to a dead one, in this respect, and must therefore be very different from a mechanical impulse. If this Gluten be said to possess the power of Vitality, it is no more than what we have been contending for; and only differs in attributing to it the means of Action, by which it is performed, but does not relate in the least to the cause from whence it proceeds.

BUT let us further observe, that the only means by which we can judge of Vitality, in any Beings but ourselves, is by an Action that we perceive induced in consequence of a prior Stimulus acting upon them; because it is counteracting the general laws

laws of Nature, and in this respect must be considered as the Action of a spiritual Agent, as much as that of the Will is, which no one disputes. A Stimulus acts upon the animal Fibre, the Fibre endeavours to expel it by an Action of its own, or a contraction of neighbouring parts; but this is no mechanical Action, for it counteracts the general laws by which that is influenced, and hence we are obliged to acknowledge it is one of those which is directed by a Mind or Spirit, that is peculiar to our constitution.

WE do not indeed alledge, that the Mind in this case is a rational intelligent cause, or that this Action is governed by that part of our Mind, which acknowledges the highest of our faculties. And this for a very good reason, because such Motions are not the object of these powers. We are far from insisting likewise, that the Mind in these cases, acts as a voluntary agent. It cannot refuse its assent, to ex-

pel what endeavours to destroy its action, and hence is necessitated to act in this manner. We must take care, however, in the prosecution of this subject, not to extend the power of the Mind to too great a latitude. And for this reason let it be noted, that in this consideration, we confine it to the particular part upon which it acts, and although we have advanced that the power of the simple Fibre, acts in expelling what is injurious to itself; yet we are far from yielding to the opinions of Stahl and his followers, that the Mind directs to what is useful and salutary, and excludes what is prejudicial to the whole system. We hope to demonstrate in the ensuing part of this subject, that even what is beneficial to the whole constitution, is necessarily introduced in this manner; that evil is of importance to promote good, and that to the one the Mind is of itself inactive, sluggish, and inattentive, but with regard to the other alone, it is diligent and active. Thus we shall see, that the final cause of these Actions,

tions, is, that Providence may as it were bring good out of evil, and that the apparent means of effecting many of his purposes, are directly opposite to the real ones.

THESE things may not only be true, in themselves, as we perceive them in the human Body ; but may be supported from Analogy. We have seen that in the general laws of Matter, the apparent and truly discovered principles of Attraction and Gravitation may be directed and depend upon Repulsion, a law directly opposite to their nature and tendency. Simplicity, let me mention it again, is the great aim that Providence has in view in the creation of the universe, and that certainly acknowledges but one principle. It is worth while to enquire then, if even in our Body one law is established for its nourishment and preservation, as well as the performance of all its functions. Let this be granted to be universal activity, and in the examining of such a point, it will be no derogation to

say, that it is productive of stagnation, or a quite opposite principle, in the same manner as resistance or rest, is produced by Repulsion in the natural world. Activity, if it were carried on in an uninterrupted manner, must certainly be prejudicial; for this reason therefore it puts on a different type, which is more salutary and advantageous.

LET us, to enforce what we have said, examine a little into the nature of some of the necessary functions of our constitution. And in the first place, take notice of the most general and most important, the circulation of the Blood. It is not a design of Providence, that a Fluid of that or any other kind should pass through the vessels of our Body, for no other purpose than to keep it in action, or become a diagnostic in cases of disease. These are circumstances too trifling for such an extensive plan; but there is nothing else in which we can see its utility or advantage, unless
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we take a view of it upon the principles already laid down, as a vehicle to administer to the support and nourishment of the constitution, its true and genuine property. As it passes along from the heart through the whole system, it acts as a Stimulus upon every Fibre, that it meets with, which Fibre reacts again upon it, and throws it off. By this continual Action it would appear, as if in time the utter destruction of the parts would be occasioned. But this must always be attended to, that it carries its healing balm along with it, and deposits in its proper place, that part of its nature that is devoid of activity, and only fit for the nourishment and preservation of the system. The circulation of the vital Fluid is the most considerable of the natural functions of the human Body; but all the rest may be said, in some measure, to acknowledge the same kind of argument. The various secretions, are only preparatories of sluggish Fluids, from the more active, or a separating the more stimulant from the

inert. Respiration likewise must be acknowledged to be a very great inconvenience to us, if nature had not provided it for the nourishment of our constitution. If it were necessary, we might demonstrate the same thing in every other function ; but we have slightly passed over even those that we have considered, though indeed of infinite importance to us, because it is sufficient for us to deduce from them the force of the argument, and exemplify our sentiments by some lively instances with which every one is acquainted.

It has been the misfortune of almost all the functions, to have met with advocates in the mechanical school ; and some have been confident enough to assert, that they are the Actions of a simple machine, instigated by no spiritual Agent, and influenced by no Stimulus. Truth, evidence, and reason are so much in favour of the contrary, that we shall not endeavour to vindicate them from such a character. The

more ingenious have long ago confuted these principles, by shewing that the effect was not equal to the cause, and that the same rules could not possibly take place as with Matter in general. The whole of our intention has been only to shew, what seems more natural and agreeable to common-sense, and that Actions might take place in the animal Body upon the principles we have laid down. And if this be not a positive proof of the truth of the fact, we hope it will appear in some measure plausible enough, to justify it from being absolutely erroneous and inconsistent.

WE are aware, indeed, of a very striking objection which may be alledged against us, from the following plea: We have advanced, that the Actions we have described, are those of a spiritual Agent, always acting in consequence of an impression made by a Stimulus upon the Body; and yet no man can appeal to his own consciousness or experience, which are the

only known proofs of such an Agent, that this Action ever happens in his Body, and that he would always remain ignorant of it, if it had not been discovered to him by reason and argument. In order fully to clear ourselves of this objection, we must examine more particularly into the peculiar nature and circumstances of the human constitution, which incline us to be conscious or sensible of the Actions going forward in our system. But this must be the business of a peculiar section.

S E C T. IV.

Of Sensation or Consciousness.

BY Consciousness, is not here intended that power which the human Mind seems peculiarly to enjoy, of reflecting upon its own nature and existence. That is a quality of this substance in particular,

and is dependent upon its rational and intellectual abilities. But by consciousness in this place, we mean *Sensation*; or a power of feeling within ourselves a peculiar affection, which begets in our Minds an idea of some alteration or change, that is made in our Bodies. This is an affection, that we can by no means imagine peculiar to the species of mankind, but is common perhaps to all Animals, and is not entirely excluded from the vegetable tribe. Notwithstanding this, however, all the actions of Animals are not affected by it, neither is it the only test of a spiritual cause, acting upon lifeless and inert matter. We have already said that simple irritations acknowledge such a cause, and yet we have no consciousness of their action. To settle this point then, let us endeavour to ascertain the differences between Irritations and Consciousness or Sensations by the following particulars.

I. We

1. WE must consider the latter as a high exercise of the former, i. e. That the substance that excites only an irritation, would, if increased in its powers of stimulating, become capable of creating a Sensation; and in this case, these effects seem to differ only in degree. To support this by a few instances. The Tears which are secreted, and ejected also, in those of tender and delicate constitution, belong to a very feeling and sensible part of the human body; but yet are, in general, harmless and inoffensive, and give us not the least degree of sensation. In consequence of this, they must be considered as a secreted matter endued with a small degree of Stimulus, and exciting an Irritation only. But if from any external cause, this humor should stagnate in this tender organ, and become more acrid and stimulant, it will not fail to convince us of a violent sensation, and create great uneasiness. The same may be said of
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many other affections of the animal machine; but it is peculiarly to be observed in almost every secretion. From hence it is, likewise, that many of the painful disorders of the human body are produced. They all depend upon an high degree of acrimony in the juices, which are naturally innocent, salutary, beneficial to the constitution, and endued only with stimulus enough to create a gentle Irritation, and to perform their particular functions. But by disorder, and much acrid matter introduced into them, or by any other means corrupted in their nature, they become prejudicial and dangerous, and occasion great and excruciating pain. The Saliva and Gastric Liquors are innocent as well as useful, but from these causes they become pernicious, bring on disorder and excruciate the tender nerves of the Stomach with exquisite Torture. This will be sufficient to shew us a natural distinction that arises between these affections: We proceed now to another difference

rence that may be observed between them.

2. THIS is to be determined by the difference of the motion that is induced, what creates but a flow and deliberate action, shall excite only an Irritation, whilst we become highly sensible of what is more quick and violent. A Stimulus applied to any part of the body, may induce only one simple contraction of the animal fibre, by which it may be expelled; and in this case, the most simple Irritation only is produced; but if it return to the attack, and redouble its strokes, we shall soon be conscious of its influence, and the quicker and oftner this is done in a given time, the stronger our Sensations will be. We may adduce our instances upon this occasion from the effects of light upon the Eye, or of sounds upon the Ear. Either of these may be perceived by us with pleasure, or may be indifferent to us, when the rays of light
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or the vibrations of sound are excited but seldom, or are slow and deliberate in their action ; but if an excess should happen in either of these respects, a strong sensation of uneasiness is perceived. We need not seek for more examples of this kind in the organs of sense only, which may be construed foreign to the purpose. The vital and involuntary powers also, will afford us sufficient evidences of the truth of the observation. The action of the heart, is performed in perfect health in a regular and equable manner ; and always when it meets with a Stimulus which is too violent, it exerts a very high degree of force to expel it, but that returns again assisted by the force of the circulation, and requires the same degree of power to be renewed in that organ. From hence it happens, that the only Idea we can entertain of its exercise being quickened, is from the frequency of the approach of the Stimulus, as well as the excessive degree of it. It is necessary indeed in some measure, in this instance,

stance, that both should concur in their action. The latter must have a great influence it is certain in the first stroke that is excited, but is only afterwards the instrument of renewing those that succeed in a shorter time. From hence it happens, that the frequency of the approach of the Stimulus is the proximate cause of the quickened pulse, which we may observe in the most common disorder of the human body. A quickened respiration in the same manner may be occasioned by the same cause; and this may happen two different ways; either from the air drawn into the vesicles of the Lungs by too quick an inspiration, or from the accelerated motion of the heart. The velocity of the blood from the circulation in the latter instance, having irritated that organ, as we mentioned above, to a quicker contraction, occasions it to drive the fluid through the lungs with a correspondent motion; and these parts being endued with a power of sensibility from this impression,

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sion, necessarily bring about the quickness of this function.

3. BUT it is not only the degree of Stimulus with which a body is endued, or the frequency of its acting upon the animal fibre; which occasions what is commonly irritable to become sensible of the impressions made upon it. The duration likewise by which it continues to affect us, is a powerful incentive to produce this effect. It may be very far from the nature of a Stimulus, when acting upon the animal fibre, immediately to occasion a Sensation. Of this we may find innumerable instances. But if it is suffered to continue there for any considerable time, we are obliged to acknowledge its efficacy in this respect. A spark of fire from an igneous body, may accidentally fall upon any part of the human frame, occasion no emotion, and be thrown off without any sensible exercise of a conscious power. But it very frequently happens, that the
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body is not endued with sufficient activity to expel it, it continues there for some time, we become sensible of the impression, and are obliged to exert our voluntary faculties to assist in the expulsion of it. It is very probable, and therefore necessary to be mentioned here, that many disorders of the human constitution may proceed from this source. The Body may be so influenced by previous disease, or the effect of former Stimuli, that the power of expelling offensive matter, shall not be capable of exerting itself so perfectly as before; and in this case not only external violence, but even the matter that is necessary to many of its functions, may become destructive of it, as well as create a sensibility of its influence. And this will be done by continuing to act upon a part which is not capable of expelling every thing that is injurious to it.

4. A VERY great difference between Irritations, and those actions of which we
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are made sensible, may arise from the different parts to which stimulating substances are applied. There is nothing more evident in the human constitution than this. One part of the body shall be fitted to be insensible of substances which another shall reject, and one part shall be only irritated whilst the other is affected with a high degree of Sensation by the same substances. The internal cause in our system by which this is occasioned, and the mode of formation upon which it is constituted, have been much disputed. We shall waive any consideration of this kind, at present, and consider it as a settled and determined fact, conformable to the reasoning of genuine Philosophy, and evident to the experiment of every searcher after truth, who has attended to this subject. A very considerable acid, such as that of vinegar for instance, when applied to the external cuticle, will hardly produce a simple irritation, and at most occasions only the corrugating of this part;

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but when applied to the Tongue, it creates a high degree of sense; and in the stomach produces excruciating, and often intolerable pains. Again, a very small part of matter, that has the least roughness in its surface, if accidentally it should fall into the Eye, one of the most tender parts of the body, would occasion much pain, and induce perhaps a strong degree of Inflammation. But if this matter should be conveyed into the Stomach or Intestines, it would scarcely ever be attended with pain, and only bring on a gentle irritation in these entrails to expel it.

THERE is a very remarkable difference of affection which subsists in various parts of the human body, and this is in some measure to be determined by peculiar substances that offer themselves. Every sensible part seems to be more particularly affected to some kinds of matter than it is to others, whilst these again shall become perceived only by a different organ, which

which may give them the preference. A very tender part, of the human body, shall be instigated to Contraction only, by many substances, and perceive no Sensation, but from some peculiar Stimuli, and these of a very acrid nature; whilst, on the contrary, parts that would seem at first view not to be in the least sensible, shall be liable to impressions of this sort from very inert substances. Let us take our instances in this case, from the alimentary canal, or the sphincter of the bladder on one side, and the soles of the feet on the other. The former of these, one should think, calculated to be made sensible of the smallest Stimulus, whereas, very often, they are insensible to substances, one should imagine, very acrid and pungent: But the latter, composed of a hardened, beaten and callous substance, are liable to impressions as often from the slightest circumstances. The motion of a feather creates a strong Titillation in them; which often terminates in Convulsions, and is

sometimes the Author of a fatal Tragedy. Besides this, it may likewise be observed, that many parts of the body, though affected with Sensation from substances of an inactive nature, are yet not so susceptible of it from some that are more acrid and pungent. This is the most conspicuous in the Eye, which although often tormented with very inert bodies, as we before observed, yet will bear the Knife without any very great pain or Torture. Of this Experience informs us in the operation for the Cataract, when every circumstance almost concurs to render it exceedingly tormenting; and if we trusted to common reasoning, we might imagine it would affect us very differently from what the fact evinces.

5. Not only the parts upon which substances act in the animal constitution, but the substances themselves, likewise, which act upon it, offer a very great difference between the irritable and sensible powers;

powers; and this is not only determined by the various degree of action, with which they affect it, but also by their peculiar nature and properties. It is but in very few parts of matter, that we find an absolute inactivity or inert quality when properly applied to an animal. They may all be said to be endued at least with a power of exciting some small degree of Irritation. The parts of matter which immediately contribute to our nourishment, destined originally by nature for the purpose they answer, no doubt have the least activity in them when applied to our bodies or any others that we know in nature. But what these parts are, and the means by which they are separated from what we take in in the form of food, is not so easy to ascertain. The whole of this œconomy is performed by a very gentle Irritation, of which we have no idea but from the effects it produces, and the separation of a very acrid and sensible matter from the nutritious

substance, after it has performed its office. Every other kind of material substance, besides that which immediately sustains and supports the fabric, must, from necessity, be endued with the activity we have described, and disposed to create some degree of Irritation. But we are not sensible of them all, we must therefore, to ascertain this point more clearly, consider matter as endued with general properties which are universally acknowledged, and others which are peculiar to different kinds.

The general properties of matter, which are necessary to be considered in this place, are those of Density or weight, or distinct Figure and Formation. The first of these, acts upon the body as matter does in general, by its specific gravity, and the body is so constituted, as to be affected by it, and to answer it by a reciprocal

procal action *. Notwithstanding that this impression is very simple, yet it most commonly happens that we are made sensible of it when it acts externally; but when it acts upon the internal parts, we are not always apprized of its force. And whenever this happens, it must be exceedingly violent, and act in destroying the constitution. Figure of bodies is also capable of affecting either our irritable or sensible powers, as it acts upon particular parts. That figure which gives roughness to bodies, affects commonly the

* This may be a proof of that general repelling principle, which we observed to instigate bodies to action. If in this present case, the action of a body by its weight upon our system, was owing to an attraction of gravitation, this attraction must either be in our Bodies or in the Earth. That it is not in us, is evident, because it never takes place, but upon contact. And that it is not in the Earth is clear, because our Bodies interpose between us and the ground, if it attracted that body, which must attract our bodies too, and we should become sensible of that action as well as the other.

latter, whilst the former are excited to action, even by bodies that are smooth and round, and have an evenness and polish in their distinct parts.

BUT the animal constitution is most affected, by what are called the particular qualities of Bodies. These have been generally ranked under the name of elements, a vague and undetermined principle from which no utility has been drawn, and which can lead to no just reasonings or conclusions upon the subject. By these particular qualities however must be understood, the most minute principles to which we can reduce bodies by any process we possibly can make use of *. With respect to the animal body, there is the greatest difference formed upon this foundation, and from these qualities, the affections of which

* That very ingenious Gentleman, Dr. Cullen, late professor of Chemistry in the university of Edinburgh, and to whose instruction I am obliged to acknowledge the foundation of every thing ingenious, that is advanced in this Treatise, has divided Bodies into six Classes, Saline, Inflammable, Metallic, Earthy, Watry and Aerial.

which we are now speaking, are principally induced. A very great distinction likewise, perhaps the only essential one that is necessary to be taken notice of, between the irritable and sensible powers, depends upon these principles. Some of them shall never be able to excite more than a simple irritation or be totally inert, whilst others shall excite the most acute and violent sensation that we can ever experience. To exemplify the former, we may take the pure element *Water*. There is no doubt but that this raises an irritation, not only in the part which it immediately affects, but likewise through the whole constitution; yet it never affects us with any sensation, and we perceive only the consequences of its Action. As an instance of the latter, let us take a saline body as an acid, which in external appearance shall seem not to be different from the pure Element we mentioned before: But upon application to our bodies, it will convince us, not only of the power of moving our fibres, but of a very
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sharp and sensible influence. We might make a division of bodies, as they differ from each other in this respect. We shall at present, however, content ourselves with shewing how they affect us, in the most natural distinction that has been made of them. Saline bodies in general create sensation upon some part or other. Inflammable bodies are always sensible in a state of inflammation, irritable only in their natural appearance. Metallic bodies act according to Gravity, except when heated, and then we are highly sensible of them; but this proceeds from the influence of the element of Fire. Earthy bodies in general are inert, and probably constitute the basis of the nutritive Matter both of Animals and Vegetables. At best, they are capable only of an irritating power. Metals, as well as these, when mixed with a salt, are highly irritating, and sometimes they become sensible by this means. Water is a very simple and pure element, and as such, perhaps, might be inert with regard to our system.

system. But in our common review of it, it is always mixed with some extraneous bodies of the saline kind, by which it generally irritates the constitution, and sometimes we are sensible of its action. Besides these, we might mention another principle, which has been discovered in bodies, viz. a fixed Air. But we can presume but little concerning its powers in the respect we are speaking of; we shall therefore leave it to the consideration of our reader, by recommending to his perusal a very ingenious treatise upon this subject by Dr. MACBRIDE of *Dublin*.

IT has been much disputed by those, who are fond of considering every phænomena of nature as the effect of mechanism, whether these peculiar qualities in bodies do not arise from an impulse of this kind, or are founded on the form and texture of the minute particles of which they are composed. They have carried this surmise so far, as to assign to the different kinds of
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Matter the peculiar figure by which they are enabled to act. But how fallacious and groundless this doctrine is, will appear from the following consideration. All bodies, which are disposed to action from a mechanical impulse must be angular, and for this reason, because there are different and various bodies in nature, and this variety can be grounded only upon such a form, for spherical bodies admit of little difference in this respect, and when joined together, can admit of no variety in Action from what they have when separated, which is contrary to what we constantly perceive; and thus if we were to grant activity to them, all activity must depend upon the same shape, which is the same with no shape at all. Having found then, that bodies, in order to become powerfully active, must have an angular figure, let us endeavour to account for the varieties of combination from these principles. A great variety of angular shapes have been given to the saline parts of Matter: Let us then
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take the most simple of these, viz. an Acid, and appropriate to its most minute particles that figure, which, from a mechanical impulse is the most powerful, that of a triangle or wedge. Let us presume also, that an alkaline body partakes of that figure which constitutes a square. By comparing these two circumstances together, we shall find that the triangle form of an acid never could subsist, and that we should never see it in a pure and unmixed state, but it would always put on the form of an alkali; and for this reason, because two triangles constitute a square, and a number of triangles contribute more perfectly to make this form. In a large quantity of this Matter therefore, the greatest part would be alkaline, and there would only be a few stragling triangles, that would put on the form of an acid. What a difference does such philosophy as this make in the real state of things, as they are presented to us, and as we determine their qualities. The same reasoning will hold good, with
respect

respect to every other figure, that we may imagine bodies capable of sustaining. They can never be preserved pure upon combination; and at last they will all be resolved into one. A square or cube is the most perfect body of any angular one, because all others will contribute at last to form it, and without a high degree of mixture. For this reason therefore, we should see all bodies in any quantity so perplexed with it, that it would never be disincumbered, but would offer itself upon every occasion. This is absolutely contrary to the fact. Bodies are so far from losing their respective qualities by their quantity, that these are very much increased by it, and it is only by adding others to them of very different properties that they are lost or obscured.

6. ANOTHER distinction between the Actions of the sensible and irritable parts of the animal constitution, may be derived from the different states in which we often find
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the Body. This may be owing to disorders, which have long prevailed in altering its original nature, to some natural imbecillity which constantly attends it, or to a difference of disposition to be affected by Stimuli which offer themselves to its Action. And this depends again on the certain peculiarity of constitution, which persons enjoy different from each other, and by which one becomes highly sensible of, whilst the other is only irritated by particular parts of matter. Nothing is more evident than the whole of this distinction. There are certain seasons of every mans own life and observation, in which he may observe a difference of feeling in his own body. The Stomach, we are all sensible, is an organ which has most commonly a capacity of receiving and digesting almost any kind of food, by a simple irritation of which we are entirely insensible: But it often happens upon the slightest disorder, that it is deprived of this power, and that its peculiar sensation of sickness and nausea is
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introduced. The same may be observed of many other parts of the human body, not to mention the affection of the Eyes by Light, of the Ears by Sounds, and of almost every other Sense, when operated upon by their proper objects in a state of disease.

As we have now settled the foregoing circumstances relating to the difference between the irritable and sensible powers, let us endeavour if possible to account for the facts.

FROM what has been advanced, we have seen, that Irritation, considered simply, depends upon an Impulse made upon the living fibre of an Animal, and the re-action of that and other fibres to expel the cause of it. We have seen likewise, that Sensation is a part of the irritating power, and is occasioned by an excess of impressions. Thus all the causes, which influence the latter, will, if greatly heightened.

tened, likewise give rise to the former. From hence it is, that we must consider Sensation, not as any peculiar kind of Action, but as a particular circumstance or affection that attends on Irritation, viz. our Idea or Notion, of what otherwise we should not be sensible or conscious: But what is it gives rise to this circumstance? It may be answered, that as the cause is heightened, and the re-action heightened, we must become sensible of them. But there is no reasoning in this explication. To make a difference of affection, there must be some distinction, either in the cause or the effect. We shall presume then that there is a difference in the effects that are produced, and this we think to prove from the following proposition.

THE cause which acts upon the fibre is too powerful for the re-action which ought to correspond to it; and hence the sum of the impressions is greater than the sum of the actions; whereas in simple Irritation, the

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sum of both these are equal. A Stimulus acts upon the body, the body expels it, and there is no Sensation: But if we can imagine this Stimulus to act with the force of *two*, and the re-action to be only as *one*, then the former will have double the force of the latter, and most probably will occasion a degree of sense. And the cause of this will be, a resistance which the body finds to its action, and which it is not able to overcome or surmount. All resistance that we perceive must be determined by duration, and to this only consciousness of action can belong. Where the impression and the action consequent upon it, are instantaneous, we cannot possibly have any sensation; because we cannot enjoy two ideas at the same time, but one must of necessity be absorbed in the other. For in this case, how could we determine to which particular consciousness ought to belong, to the Impression, or the Action that is occasioned by it. To bring an example to prove this, we may refer only to a number
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of colours fixed upon a wheel ; where in a constant revolution, the distinguishing marks of every particular, are entirely lost, and the whole seems to have the appearance of a white, which is no colour at all. This notion of resistance, as the source of Sensation, is not entirely imaginary, for it may derive some assistance from analogy with other affections of our minds. To enforce it, let us appeal to those Sensations or Perceptions we receive from what are called the Organs of Sense. We more easily form an idea or notion of any objects, that are of a rugged, uneven and rough surface, in which we more difficultly overcome the resistance that is made to our view, than of those of a smooth and polished surface, which are easily perceived, passed over with indifference, and most readily forgot. This is not only evident in objects of Sensation, but must likewise be acknowledged in those of Reflection likewise ; the more smooth and even the countenance of any person is, the more easily it is forgot ; and every thing

incomprehensible, carries with it the idea of something round and even. Hence it is, that we represent Eternity, and all our Ideas of Spirit, whenever we revolve them in our minds by a figure of this kind. Whether upon the whole, this doctrine is fallacious or not, we leave the world to determine; to us it appears more than probable, but we hope further to elucidate it when we shall hereafter consider the different modes of sensation more particularly. At present let us attend a little to the final cause of the distinction, between the affections of Sense and those of simple Irritations.

IT was to answer a noble, wise and important design of Providence, that we were thus created, not to be sensible of those actions in our constitution, which are the most necessary to the support and preservation of life. For it not only relieves us from the trouble and anxiety of constantly attending to them, but deprives us of an

opportunity of wilfully injuring our most useful functions, or destroying our very existence, without the knowledge of the rest of our fellow creatures. If we were to have transacted the whole concerns of our being, by a consciousness or sensibility of the action of the vital powers; it would be impossible that we should ever have attained that just and regular management of them, that propriety requires; and we should now then have forgot the utility of their exercise, and have sacrificed our lives to the inadvertency. But this may be a consideration superior to every other, that perhaps all Animals have something else to do than attend merely to the preservation of their being. Man in particular has so many avocations and employments, arising successively one after the other, that it would be impossible he should attend to any of them with diligence, but at the same time he must neglect the necessary functions of his body. The preservation of our being is not the subject of

mental attention or consciousness, notwithstanding it depends upon the Mind, and is entirely to be supported by that principle that directs us in all our concerns of life.

MANY philosophers, and some of them indeed of the greatest note, have considered Consciousness as an essential property of the Mind, without which Affection could not possibly exist. But that this fact is disputable, is evident from the following consideration; that there are many voluntary actions which we often perform without it, and very often lose it in those circumstances, where before we attended to its influence. This is most evident in the want of attention to the striking of clocks, or other sounds of this nature, when we are much used to them or diverted by different objects. There are the same powers present to occasion the sensibility of the Mind in these cases as well as any other; but the attention of our conscious powers,

powers being withdrawn, the lower influence that continually guides and directs the system, throws off the impression without any notice being taken of it. From this and other circumstances of the same nature, many have been led to imagine that the Mind formerly was conscious of the exercise of the vital powers, and that in process of time, by frequent neglect, it became entirely deprived of this attention. We shall not endeavour to confute this notion, because there is no necessity for the supposition to support what we have alleged. If Consciousness is an essential quality of the Mind, it must always adhere to it, and never leave it to itself; and if the Mind can exist without Consciousness, there is no necessity to seek for it as a part of its nature.

WE flatter ourselves that our sentiments upon this subject, are not only more probable, but more plausible in themselves, and more equal to the consideration of a

vulgar capacity, reflecting on its own powers, than what has hitherto been alleged. Upon the whole then, let us conclude with this slight recapitulation of what we have advanced : That the simple Irritations, or primary actions of the animal body are the actions of a living fibre ; That this fibre is directed by a mental faculty : That the reason why we are not conscious of this action is, because the impression upon the body from a Stimulus, and the action which expels it, are instantaneous ; But that when the impression is superior to the immediate action, we begin to be conscious of it ; and that upon the whole, this forms the distinction between those actions which have been called Sensible, and those which are irritated only to contraction.

BEFORE we dismiss this subject, it will be worth while to take notice of a distinction that has taken place in Physiology, and has been canvassed by the most ingenious

nious persons of the present age. The learned and accurate Baron *Haller* first started the notion of some parts of an Animal being sensible, whilst others only were irritable. The facts seemed to be founded upon observation, and though much disputed, might be just. But the theory which he built upon it, was exceedingly fallacious. He imagined there was something distinct from the human Soul, which occasioned the latter power, and that it was directed by the efforts of a mechanical influence. But if he had attended to the facts, which we have already laid down, to enforce the distinction between these effects, he would have found no doubt the truth of our observation, that the Action is one and the same; but that as it varies in its different effects, our thinking faculties become interested in the review.

S E C T. V.

Of the Origin of the Sense of Pleasure and Pain.

EVERY thing which offers itself to our Sensations, or becomes the object of our Consciousness, is always attended with one or other of these modes, Pleasure or Pain; the former arising from those things which are agreeable to us, and which we desire to retain, the latter from those that are disagreeable, and which we desire to avoid. What there is in the Mind that should create either of these Affections, upon the access of such objects, is not easy to explain, and can be referred only to the will of the Deity, who originally intended it for our utility and advantage. It will be more to our purpose to enquire how it is, that the agreeable or disagreeable Sensations can arise from the sentiments we have already delivered

vered concerning the general Idea of Sensation, and the bodily Affection to which we have attributed it. We are originally constituted to become active, and not passive Powers, and by this Action we are inclined to expel every thing that offers itself to the animal Fibre by a living effort, as we have already said. Resistance from any external circumstance is what restrains our active Principles, endeavours as it were to destroy their influence, or at least to curb and check them in their Action. The Sensation then that we perceive, from such an effect, must inevitably be disagreeable and uneasy to us ; and from this we conceive the idea of Pain, or the consciousness of those Sensations that are disagreeable. To illustrate this more particularly, let us reflect a little on the nature of the different kinds of Pain to which we are accustomed.

THE different varieties of this Affection may be resolved into two kinds ; either that which tends absolutely to destroy the
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human Fibre, by lancing or dividing ; or that which operates by a constant unvaried compression. It is the former of these sorts which most merits our attention, and is what we most frequently meet with. At first sight, it does not seem to be established upon the principles we have laid down. But if it be considered that our opinion of Resistance is not a mere mechanical opposition to the Action of the Fibre, but is determined by the Action of a Stimulus, which overcomes the irritable and active powers, and that it does not destroy the Action of the Fibre, but only prevents the effects of it ; this may be more easily deduced from it. We are not merely to attend to that kind of Pain, which is determined by the knife, but all those that are occasioned by acrid and corroding substances are what particularly belong to this head. The ratio of the Pain, which proceeds from these, will very much corroborate our sentiments. Thus a violent Stimulus acts upon the Body, it endeavours

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to expel it, but the Resistance is too great to be overcome, the Body continues to act, the Stimulus wont give way, and hence it is that the violent Sensations arise: But if by any artificial means the Stimulus is removed, the Body is restored to its usual freedom, and the Pain entirely ceases. The Pain that arises from the knife, as in the amputation of a limb, &c. does not properly belong to this head, although the ultimate, but not the immediate effect of this operation, is of this kind. It belongs more properly to Compression, which must be considered as a mechanical Influence. For it is not the immediate part that is cut thro' which most probably feels the pain, but the neighbouring and adjacent ones which are violently compressed at this time*. Compression, although a mechanical influence, excites, when violent, very grievous pain, induces the Body to action, and
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* This may be demonstrated from the extent of the Inflammation which arises in consequence of such operations.

by its force overcomes and resists it. By this means it acts as a Stimulus, and creates the same effects. But this is no argument that Stimuli act by mechanical properties. For although Mechanism may have this influence, yet this is no proof of the converse of the proposition. Many very learned physiologists have favoured the opinion that all Pain proceeded from a danger of the solution of the Fibre, and the cause they have adduced from a principle of our thinking Faculties, the apprehension of what was destructive to the constitution†. But without they can determine, something already present, by which this thinking Principle shall be brought to Action, their reasoning will have but little efficacy in this affair. It is from nature, and our original
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† Si fibra nervosa, cerebro orta ita extenditur vel alio modo disponitur, ut dissolutionem minuetur, fit Doloris Idea. Boerhaavii Aphorism. §. 220.

Tot malorum auctor simul tamen vitæ custos est, qui et de præsentē noxa, ejusque consecutionibus, mature monet, et compellit ad medelam quoque modo querendam. Gaubii Pathol. §. 675.

constitution that we are to seek for every Affection that happens to the Body, and this will inform us, that it is something which really exists as an acting Principle in the Body, and not what threatens a mischief to it that causes Pain and Uneasiness; and that notwithstanding the dissolution of the immediate Fibre may in some cases be threatened; yet this is only an effect, and can have no kind of reference to the origin of this Affection. Much less then can the apprehensions of a general evil to the system, be productive of it.

LET us now enquire how it is that Pleasure arises in us, or that we perceive something in many Actions very agreeable to Sense. It is not in the object or thing itself that offers, that we must seek for this Affection, but must refer to the same Actions from which we found Pain to arise. This is not to be determined by the degree of Action in the Stimulus, for in that case every slight Pain would be a Pleasure,

sure, which is not always the case. We must rather attribute it, to the Action of the animal Constitution, and reason in the following manner. We have seen that Pain arises from the Resistance which the Stimulus makes to the Action of the animal Fibre, which cannot possibly prevail to remove it; and in this case the remote cause of the Affection we must attribute to the resisting object. But if we suppose that after this Resistance has been made for some time, the Body acquiring new vigour be enabled to remove it, then no doubt but the Action will be very grateful and constitute Pleasure; and here the remote cause must be sought for in that influence which the Body acquires. The difference then we see between these Affections depends entirely upon circumstances relating to the most simple Actions of the animal Body, and is determined in a great measure by the power of the Mind over them. It is not only easy to conjecture that this may be the means by which pleasant Feelings are produced,

produced, but we may carry the theory a little further, by supposing that the Mind exerts not only a sufficient degree of Reaction, to expel this noxious matter, but that it adds to the force of it, bestows more of its power than is just necessary to promote the end, and glories in the conquest it has made.

AN objection may be made here that Pain is necessary to precede Pleasure, and that we should always have a Sense of this Affection previous to the Influence of the other. This is very often the case, as must be acknowledged by every one, and where it is not so, it must depend upon the short duration of Resistance that is made. The Body is not so powerful as that it can expel any very great degree of Stimulus, it must be therefore from the slightest degree which Pleasure arises, but yet there must be some Resistance, or no Sensation would arise as shewn above. In this case then, the time of the Resistance,

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and that of the Re-action, must very little exceed that of a simple Irritation, but the latter prevailing, and that often in a superfluous degree, makes us more sensible of it, whilst the force of the Resistance is entirely obscured and obliterated. This will be more evident, if we reflect a little upon the nature of those Sensations which give us Pleasure. Titillation is generally reckoned to be one of these: this is brought about by a slight Impression, but the Motion, by which we are continually agitated, is very evident and distinct. If the Resistance continue any length of time, we perceive it and become uneasy; but if the Motion of the Fibre immediately succeed, we perceive no Pain to arise from it, but the opposite Affection takes place. The same may be said of all the Pleasures we experience from Sense. It is well known that Pleasure is very instantaneous and accompanied with visible Motions; and besides, it is universally acknowledged that this Affection, if continued for any time, becomes intolerable Pain.

To confirm our sentiments upon this occasion, we may enforce them, not only by an enumeration of the Pleasures we derive from the different organs of Sense, which we shall afterwards consider more particularly; but from analogy with the origin of these Affections, when referred to our moral powers. Where our Wills find a reluctance and difficulty to act, there it is that Pain and Uneasiness arise; but where they are able to overcome all difficulties, to act freely and without controul, we experience the highest degree of Pleasure. It is the same in objects of Taste, those things that are disagreeable and harsh, have a certain deformity, roughness, and unevenness of surface, by which we cannot comprehend them; or are full of discordant sounds which distract our Attention. But Beauty, Uniformity and Harmony, attract and please wherever we meet with them.

BEFORE we quit this subject, let us review the whole of these Actions, and the circumstances belonging to them, compare them together, and perhaps, by this means, throw some further light upon the subject. The most simple Action of the human Body, is an Irritation. It proceeds from the Impression of a Stimulus and the Re-action of the animal Fibre. These Actions are synchronous, and upon this account the sensible part of our nature does not become acquainted with them. They are likewise equal with each other, and although ever so numerous, yet the sum of the Actions is always in proportion to the sum of the Impressions. This is the case with those of which we are not conscious, but whenever this Affection takes place, it is necessary that some further Impression be made, inasmuch as to cause a Resistance, and there the sum of the Impressions is superior to the sum of the Actions; and we must not only become sensible of
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the Action, but it affects us with Pain and Uneasiness. But if this Resistance last but for a short time, before it is overcome and expelled by the Body, and a high degree of power is exercised for this purpose; the force of the Resistance is obliterated, and in the given time the sum of the Actions is superior to the sum of the Impressions. We become sensible also of this effect, but it is a Sense of a different kind, and as in the other case the continuance of the Resistance gave Pain, this power which we exert to overcome it, occasions a pleasant and agreeable Feeling.

S E C T. VI.

Of Perception.

BESIDES what we have mentioned, there is another distinction, which offers itself upon this subject, and which requires our examination, before we explain the

Sensations that arise from particular organs, appropriated to convey them. In some of these we are not sensible of the Irritation which is made in them, and we perceive neither Pleasure nor Pain to arise from their Actions. They however convey notions to our Minds, from their influence we derive a high degree of Information, and that act of the Mind, which the Metaphysians denominate Perception, is performed. Let us adopt then this term to express this difference in our Irritations, and make a new species of these Actions easily distinguishable from mere Sensations. But how this Perception is brought about by a corporeal Action, will be more difficult to explain, perhaps, than what we have already examined. It is certainly a kind of Irritation, excited by a Stimulus, and admits of a reciprocal Action of the animal Fibre to expel the cause of it. But we are conscious, neither of the Impression, nor of the Action, that results from it; and yet in one sense it may be said to be a kind of Sensation,

tion, as it informs our Mind of some notions of which we were before ignorant. These notions, however, are very different from those which we experience from our common Feelings, and upon this account must be considered as a different Affection of the Mind. May not this distinction in some measure be sought for, in structure and organization of Parts, properly fitted to convey particular Ideas to the Mind, and established upon a correspondence or agreement between the Organ and the stimulating Matter that acts upon it? This opinion is not by any means incongruous with the general rules we have laid down. It only refers to a higher principle than we have already considered, the immediate Action of the Mind in the exercise of its own powers. And in this view, it is no more difficult to imagine, that upon a peculiar agreement of parts of Matter with the nerves of our constitution, such an Affection as this should arise, than that Sensation should arise from a kind of disagree-

ment of parts, that Resistance should occasion Pain, and the overcoming of it should be the cause of Pleasure. Perception may be considered as one Affection, arising from Irritation, and Sensation another; but with this difference, that the latter is established upon the mode or manner of the Action, whilst the former is founded upon the Bodies which make the Impression. In general, those Bodies which act upon the irritable Fibres of the organs of Sense, cause no Perception; but are received and expelled without any notice. But upon peculiar Bodies offering themselves, they cause an idea or notion to arise in the Mind, and it is so established, that by peculiar organs, and those only, these Bodies shall be permitted to act, and where these are not provided, it is evident that they cannot possibly have any influence or effect, but must pass off unnoticed and unattended to. From what we have advanced, we are enabled then to form this conclusion; that Perception is an Affection of the Mind,
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different from common Sensation, notwithstanding it be founded upon the same Action of the Body, and the Irritations caused by stimulating Matter are the original of both. At the same time, however, let us take notice, that many of the organs of Perception, or of Sense, as they are generally called, are capable likewise of very acute Sensations. This we shall examine hereafter in a description of these different organs, and distinguish between those that are more properly organs of Perception, and those of Sensation, and where they agree in having both these affections, point out the distinguishing marks of each.

IF we examine this subject, however a little more particularly, we shall find that Perception certainly admits of a mode of Action, and in this it resembles in many respects that Action which occurs in Sensations, and thus will bring a stronger proof of its foundation upon the irritable power. In our examination of simple Irritations,

tations, which could not produce Sense, we observed that the Re-action was always instantaneous with the Impression; and that where the Resistance was sufficient to destroy this effect, Sensation always arose. But we are not to consider this space of time, as a mathematical instant, which will admit of no intermediate distance. All time is established upon comparison, and an hour a-day, or the greatest length of time, may appear to superior beings, as a second of time does to us. In the case before us, we may refer in our Minds to a space much shorter than we can be sensible of. That time, in which a simple Irritation is performed, no doubt will admit of this distinction; for we are never sensible of it till a great number be excited. We may give an instance of this from the circulation, we perceive the beating of the heart very often to be synchronous with the pulse, and yet a thousand Irritations must be raised by the blood, in its passage from
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the heart to the artery, where the pulse is felt.

SINCE then, simple Irritations are performed in such quick time, that it is impossible we should be sensible of them, and that there is a great deal of intermediate space, in which we may not be conscious of the Resistance that is made; why may not Perception, be established upon some action of the same kind, where the proper objects present themselves to it; and thus it will appear to be only a more quick Sensation. We leave the determination of this conjecture to the judgment of more wise and able persons; and all the confirmation we shall endeavour to give it will be from this proposition. That Perception is always performed more quickly, suddenly, and instantaneously than Sensations are ever produced. This will appear perhaps to many, no more than the effusion of fancy and imagination, upon which no judgment can be formed, or any truth ascertained. But to
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any one, who reflects in what a surprizing manner, the rays of Light, the vibrations of Sound, or the distinctions by tangible Qualities excite Perception, will not wonder that we have given to this affection a superior degree of excellence. With regard to Sensations, we are not always so absolutely acquainted with the causes which produce them, as to be enabled to determine the distance of time in which this effect is produced. But in those cases, where we can observe the operation of the cause, it does not appear to be immediate. It may be justly enquired how are we to determine this question? It would be ridiculous to search for the decision from the Sensations themselves. For they could ascertain no more than that we begin to feel, as soon as we feel in reality. A truth indeed which no one can dispute or subvert. The proper test will be some other power, which we set up to evince this fact. But what can we employ, but this percipient power, and if it be capable of this, it determines itself
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in its superiority without any controversy. Let us see, however, how far with justice this can be done. It is certain we can perceive an object by our external Senses, not only to approach us to destroy, but likewise to act in the manner it often does, when it causes a Sensation, previous to that effect. There are few people who ever perform amputations upon themselves, or mangle their bodies when in their right senses, so as to perceive any peculiar effects with attention. But in those operations, which are performed upon others, notwithstanding the terrifying apparatus that is prepared, the powerful workings of fancy, and the terrible expectations of approaching torment, with which the mind is agitated; yet we may perceive instants between the shrieks of the patient, the most certain marks of Sensation, and the operation of the knife. This we hope will be sufficient to found our conjecture upon, that Perceptions arise from more simple Irritations than what Consciousness of the
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Action does. We shall now proceed to a further enlargement of the subject; and first let us consider some of the modes of this Affection.

S E C T. VII.

Of the Pleasure and Pain which result from Perception.

IT is not the chief end of Perception, to convey to us ideas of Pleasure and Pain, any otherwise than by reflecting upon the objects of it, we become enamoured or displeased with some particular circumstances which belong to them. But yet notwithstanding this, there is a kind of intellectual or perceptive enjoyment, that we often derive from the immediate operation of the Senses. It will be necessary then perhaps, that we should explain the difference between

tween this, and the Pleasures we derive from Sensation, which we have above described. It is a distinction indeed, which reason dictates, and which will be much insisted on in the future part of this Treatise, and therefore it is well worth our attention. Every man, who reflects in the least, upon the ideas he receives from external objects, will grant there is a very great difference between the Pleasure and Pain, he receives from his common feelings and the disagreeable idea he receives of bodies, as they affect the peculiar organs of Perception. To illustrate this by an example, a very rugged Body, such as a sharp and uneven piece of Flint, when rubbed hard against us, gives a very sensible Pain. But if at any time we should shut our eyes, and such a body should be presented to us to handle, yet although it were in the most gentle manner, we should find a disagreeable idea from it, different from what we usually feel, and what might very properly be called a perceptive or intellectual Pain.

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In the same manner as sensible Pains are produced by a Resistance to a free exercise of the animal Fibre, so this may acknowledge the same cause, and allow of a degree of Irritation, to be determined by the principles we have already advanced. Perhaps we ought to go no further than the form or peculiar disposition of the subject, to be affected by the respective organ, and allow only of a disagreement in the parts to effect this purpose. No doubt but this will occasion a difficult Perception in our Minds, and from hence give a painful idea from this circumstance, but the slightness of the affection will in some measure tend to make it too inconsiderable to be taken notice of. But when we take in the same mode of Action, indeed as in Sensations, it may more readily be distinguished, and something like a sensible Pain be produced. In the same manner likewise the agreement of different kinds of Matter, with the animal organs, may produce a mutual Action between them, and from the ease by which
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this consent is obtained, some negative kind of Pleasure may be derived. But the greatest Pleasure of this kind must arise from overcoming a resistance perceived in the Body, in the same manner as was mentioned with regard to Sensations. The percipient Pleasure and Pain which we have here considered, if it be established on the object, rather than the mode of Action, cannot properly be called sensible, or ever arrive at such a degree as to admit of this Affection. But if it be founded upon this latter quality, and arrive to a very high degree, a Sensation may arise from it. And this, because as it is an Affection of the Action of the simple Fibre, and is determined by time, if that be increased, it will appear in this character. This we shall have occasion hereafter to consider; and may be able perhaps to derive some considerable consequences in Physiology from this source. But we proceed to examine the Motions incident to the different Organs of Sense.

C H A P. V.

Of the ORGANS of SENSE.

S E C T. I.

Of Touch.

WE shall pursue this subject in the following order, begin with those Organs that more immediately resemble our Sensations, and gradually ascend to those that are more intellectual, and convey the most instruction to the Mind. The first which we shall examine, is that of Touch, or a general disposition we have to perceive bodies when applied to almost any part of our system. There is one part however, in which it is more considerable than the rest, where we

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feel most distinctly and completely, and which may very properly be called its peculiar Instrument. This is the extremity of the fingers, where nerves are branched out in a great quantity, to adapt it to this purpose. There is, however, no particular mechanism, fitted for the exercise of this Sense alone, which by peculiar structure and organization will admit of this Perception. It has the same formation with the rest of the body in this respect, and is capable of many other offices. Notwithstanding this, it must be considered as an Organ of this faculty, we receive information from it, of the shape, figure and extension of bodies that present themselves. There are many other circumstances too, and some very incredible, with which we become acquainted by this means. There have been so many instances, of the discovery of different colours, by persons who could use no other sense for this purpose, that the fact is now placed beyond a doubt, and the surprizing feats of blind people,

which may be every day observed, will convince us that this Sense has a great acuteness as well as being the author of a considerable extent of information to our Minds.

LET us now examine how it acts, in order to produce these effects. It is the surfaces only of different bodies which become the peculiar objects of its attention; and by these, we in some measure derive information of their shape, figure, and situation. But how is this done? If the body was just presented to us, we might indeed in some measure perceive an effect; but in that case, we should be sensible of mere Resistance only. This Resistance however would create in us neither a sensible Pleasure or Pain, and it is hardly to be conceived, how even an Irritation could be produced. But we must consider in this place that it is mere Resistance, endued with no active power, and which indeed is so slight as that it may not excite even this Affection.

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We cannot however distinguish a true Perception, or discover the least configuration of parts without Motion; and the Motion which is necessary in this case is very particular, as we shall see when we come to consider the other Organs of Sense. It seems to depend on a voluntary Action, such an one being almost necessary to produce it. Objects in this Organ do not obtrude themselves upon us, and demonstrate their figure whether we are desirous of it or not. But we examine them to find it out, we excite a Motion in these parts which act again upon us, and cause such an Irritation as makes us acquainted with this quality. It might be imagined that Touch arose from a succession of Resistances, but the whole of this Perception does not depend on this alone; for if that were the case, we could not distinguish it from a simple Sensation, and the variety of figures could not be at all discerned. There is the same succession of Resistances in a spherical, as in a cubical body of the same dimensions; but we

know how to distinguish them from one another. There must be something then of agreement, in the Body itself, and our Organ, by which this Sense must be determined, and although it is formed originally upon a Resistance from Irritations, yet that is not sufficient to cause the idea we have of bodies from this Perception.

THE Perceptions of this Organ so nearly resemble our common Sensation, that it might almost be called an instrument of that Affection. By means of it, we not only perceive the various shapes of bodies, but have a high degree of Sensation from it, and it is capable of affecting us with sensible Pleasure and Pain. Every one from experience will find, that the handling of smooth bodies, with equal and regular surfaces, and especially those that yield to the Touch, as velvet, &c. give a very pleasing and agreeable Sensation. This depends too upon that principle on which we derive the origin of this Affection, the

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overcoming a Resistance that is made to the general Action of the system. In the same manner, bodies whose surfaces are rugged and uneven and without polish, affect us with a high degree of Pain, and I think I have heard of convulsions of the nervous system produced from this cause. Upon this principle it is, that the different Affections, which hardness and softness likewise in bodies occasion, must arise. These have been considered as qualities in bodies of very great consequence. They are peculiarly founded upon Resistance, and upon this account the Organ at present under consideration might be esteemed an instrument of Sensation.

BUT there is very great intellectual Pleasure or Pain, to be derived likewise from this Sense, and this has been the occasion perhaps of forming an Analogy with some peculiar circumstances of moral beauty. It is evident to every contemplation, that the handling of smooth as well as round bo-

dies is a fund of very great satisfaction to the percipient Power, whilst those that are rough, uneven, and angular, are peculiarly distasteful. This instrument enjoys a peculiar delicacy in this respect. Variety may be borne by the Eye, whilst it constitutes beauty, and discord may please in music, whilst it is productive of harmony. But to the Touch, the least kind of roughness that interposes in a smooth figure is the cause of great uneasiness. The reason of this seems to be that the Mind is more confined in this Organ than in any other. It is a very small scope that is allotted to the Touch for its exercise, and the succession of Ideas which proceeds from it is very slow. Whereas in the other Senses, there is a vast field which they can review instantaneously, or attend to in a moment. The succession likewise with which bodies are presented to us in them, is so quick, that many are passed over without attention, and we are captivated only with the prevalence of those that are agreeable, or the contrary.

WE may explain the cause of this Pleasure and Pain by analogy from the same source as we did those of Affections, when produced by Sensations. The one is an action of the body, while the other more particularly belongs to the mind, we perceive a body with ease that is smooth round and has a little irregularity in its surface; but rugged and angular bodies are not easily perceived, because from their unevenness they offer many Resistances to the power of the Mind in conceiving exactly of their nature.

S E C T. II.

Of Taste.

THE world hath branded the Perceptions of this organ with a very powerful opprobrium, as what brutes enjoy in common with the human species,

species, and as leading very little to the use of those internal abilities, which distinguish mankind. We have already considered Touch as an instrument very nearly allied to our common Feelings, and the general notions of Sensation, and yet notwithstanding this as of great importance in assisting our rational powers, and in some persons as the sole judge of what in others is supplied by their sight. In this capacity indeed, the organ under present consideration, is not so noble a faculty; but yet it excels it in this point, that its perceptions are more distinct from Sensations in general, and the Pleasure or Pain that arises from it is more intellectual or perceptive.

IN the review of this organ, we find more distinct corporeal powers appropriated to it, than to the last we considered, and here it is that we begin to observe the first dawn of a particular seat of the Senses. This is in the Head, the principal as well as most exalted part of our system, and where
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all these organs, except that of Touch, are centred in a cluster. From hence, it would seem to a Physiologist, whose views are never removed from his objects, as they lie before him ; or rather to an Anatomist, who pursues no farther than his knife, that this part of the body was entirely adapted to the perceptive part of our constitution ; that its form was calculated only to promote their powers, and protect them from danger ; and that its various operations were designed for their use and protection. The reasoning Philosopher would not object to these opinions, did not he find from observation, that we are not to refer a general affection to a particular part of our constitution, but that a system is established, upon which the whole is to be maintained uniformly and regularly ; and that the use of any particular parts, is not independent of others. That the origin of the nervous system, does exist in that part of the body, where the organs of Sense are placed, and that the nerves which communicate

municate with them, are derived immediately from the brain, are truths that no one will controvert. But yet there may be found very good reasons for these facts, without making the one, in the least dependent upon the other. The information that one organ receives from another, or the mutual assistance that is given to each from its neighbour, requires a vicinity also which no one will dispute. We all know what assistance the organ of sight lends to that of Taste, in the choice and distribution of our food. If one had been placed in the lower part of the body, whilst the other remained where it is, it will be evident the same advantages could not be reaped from them, as we experience at present. Besides, it is highly necessary, that organs which give information of things around us, should be placed in the upper part of the body; for there they have a greater field upon which they may exercise, and be more free and independent of other parts, which are destined more particularly
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to execution. This opinion will be confirmed likewise, if we consider the protection that this situation procures to the nervous system. Exalted to that station, it becomes more secure from injuries, and adopts these organs as its peculiar and more immediate guards. But waving these considerations, it was necessary the nervous power should derive its origin from one fountain, and the Head seems the most proper for this purpose, without attending to the necessary seat of Perceptions. To conclude, however, I cannot help thinking that the organs of Sense would have been equally as perfect, with regard to their own exercise, if they had been placed in any other part of the body, as they are at present, and that the nervous influence would be as instantaneous in the Foot as in the Brain, where it is now situated.—But to return to the Sense, which is the immediate object of this Section. The exact seat of it is in the mouth, but whether it be confined to any particular part, or distributed through

through the whole of this cavity, is uncertain. Some Physiologists have determined this affair in a very particular manner, and have given us descriptions of different parts where it is more or less exquisite. They have not only done this, but have appropriated to these parts the variety of Tastes which we perceive. It is not to our purpose to enquire so minutely into the subject; we shall therefore presume, that the Tongue is quite sufficient for this purpose, and although it has a very different use, yet it is by a power very distinct from this, by which it becomes capable of that effect. In such case, it acts by a mechanical influence, and depends upon an effort of the Will. But here it is determined more particularly by structure, and peculiar organization. It consists of a number of small secretory glands, terminating in papillæ, by which it constantly emits a liquid which is capable of dissolving all bodies which are adapted to this use, and by that means of raising the distinct Perception which affects,

fects us. Solid bodies are not the objects of this instrument, it is by necessity required that they should be dissolved and become liquid before a Taste can be perceived in them. The use of this will be readily acknowledged. The objects of it are carried through our constitution, and pervade the smallest vessels of our body. Besides, bodies being brought into a soluble state are more subtile, and of consequence act more powerfully upon the nervous fibres. By this means, they are enabled to re-act, and create, in the manner we have described, the particular Perception. From these sentiments, it might be concluded that Motion, or a mutual Action of a Stimulus and the animal Fibre, was necessary in this sense. But we can bring a more clear and certain proof, from considering the immediate objects of it. And to this purpose, let us attend a little to the variety of Tastes which we may observe produced, and enquire into their respective natures and qualities.

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THERE is no subject, that can present to us so great a field of contemplation, as this ; for almost every particular body conveys to us a new Perception. It has been attempted to reduce the whole of them to some particular standard, and to establish it upon this foundation, that all bodies by Analysis may be reduced to some particular qualities. But it was not considered, that by this process, they are entirely destroyed, and in consequence of that, are deprived of those peculiar marks upon which their Taste was grounded. It is certain indeed, that from the mixture of some principles or elements in a particular way, the variety of Tastes may be produced ; but in what manner bodies are combined for this purpose, is very difficult to ascertain. If this Perception itself could inform us of any thing in this way, it would become a faculty of the highest utility. But at present, we cannot expect much from this quarter, every man's own feelings,

feelings, in an affair of such delicacy, are not to become a test of the sensations of another, and perhaps we have much better authority by which we can judge. This will be an Analogy with the different artificial combinations and resolutions of bodies, which we see produced in the universe. Dr. Grew, whom we before-mentioned on the subject of Vegetation, has divided Tastes into ten different kinds, all distinct from each other, and has described the cause of each. But there is a prior distinction, which it appears to me, ought justly to be established previous to what he has advanced. This would be a division into the sensible and perceptive. Thus under the latter may be included, sweet, bitter, acrid, saline, and aromatic; but warm, cold, astringent, pungent, and malign, more properly belong to the former. This is according to his distinction; but the whole of what he has advanced on this subject might be much improved. The Taste of Aromatic is certainly not original or simple, and the ma-

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lignant is entirely imaginary. The peculiar taste of Salt, or what he calls Saline, is quite indeterminate, for every kind of Salt has a taste particular to itself. If we consider this properly, we shall probably find, that there are but three simple and original Tastes of *perception* in nature. Those of Sensation must be included under that general notion, must be considered only as instances of that affection, and referred to that part of our Treatise—The three simple Tastes of Perception, are a Sweet, a Bitter, and a Sour or Acid. And from these I think it may be very easy to determine the nature of the rest, however altered and compounded by the various mixtures and combinations they undergo. We can perceive these principles in almost all bodies, and where these tests are taken away, we have some other easy proofs of their presence and existence, which we shall endeavour to demonstrate.

I. THE first that we shall examine is the Sweet Taste : This results from a saccharine principle, or sugar, which resides in almost all bodies we are acquainted with. We all know that substance, which is generally called Sugar, the production of a certain Indian plant, extracted from it by art, and presented to us in its own peculiar form. In this appearance indeed, it seems to be something *fui generis*, conveys an idea to our minds that is peculiar to itself, and resembles something of the highest degree of simplicity. But yet perhaps, if we make a chemical resolution of it, it will be found more complex and mixed with a variety of other matter.

IN the first place, common observation, as well as experiment, will inform us, that it partakes of the nature of saline bodies, that it enjoys a great degree of activity from this source, and that it forms very evident Chrystallizations, the most certain mark of that class. But it is not a Salt of that

kind which we call neutral, it must rather be ranked under a species of that fort which take an earth into their composition. This is evident to experience as well as this reasoning, that it is a vegetable production, where no other can form the part of those beings of nature. The Salt that most probably incorporates with this substance, is an Acid. This gives it all its activity; without it, it is inert, sluggish, and devoid of all other properties, but what it enjoys in common with other parts of Matter*. There is another substance, which we may perceive equally evident in Sugar.

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* The composition of fixed Salts, is made in this manner; an Acid, which is always necessary to their formation, is mixed with a Salt of a different kind, viz. an Alkaline, and it forms a Neutral, a body that partakes of the properties of neither of the originals which compose it; but when it meets with a terrestrial substance, which it does not only in the bowels of the earth, but in plants which are extracted from it, it forms an earthy Salt, and when it meets with a metal, it forms a metallic one. These are all the fixed Salts in nature that have been as yet discovered.

This is an oily principle, which gives it an unctuous and saponaceous quality. These three combined, an Acid, an inactive Earth, and an Oil, constitute the basis of this substance, and are the foundation of its action upon the human body, and the means by which it occasions the Taste of sweetness, which is observable upon the Palate. The acid gives it activity, by which, after it is dissolved, it excites an Irritation in the tender Fibres of the Tongue. But the Earth is so intimately blended with it, as to deprive it in a great measure of its active properties. By this means, however, it does not become a medium between these two substances that entered into it originally, but appears quite of another nature. But yet it is not sufficient to create that mild, bland and pleasant Perception that is observed in the saccharine principle. This quality is supplied then, by the Oil, a smooth inactive substance that is calculated to sheath and blunt every thing acrimonious that it meets with. In a review of the

Action, of this sense, we shall find that neither of these substances act by their own power, either obscured by one another, or in succession ; but as a new principle is raised by their commixture, it is that which occasions the peculiar Perception.

THIS Perception of a sweet Taste, has always been acknowledged to convey to our Minds the idea of something pleasant and agreeable ; and this is evidently more of the perceptive than of the sensible Nature. As smooth and without pungency it may be acceptable to common Sensations ; but the particular idea it creates must arise from Perception. If in any case we are allowed to admit of the congruity of animal and vegetable substances, with respect to nourishment, here we have a large field to range in, and contemplate the Providence of God, when we consider the final cause of these Actions. Almost every plant is endowed with this substance, and the juices that contribute to its own nourishment are

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always of this nature. But there is no exception can be made to that Matter from which we derive our sustenance. That alone is fitted for this purpose, that hath it in the highest degree, and what differs from it, constitutes either medicines or poisons. Mr. Margraaf of Berlin, has with the greatest accuracy, illustrated this subject, by the most judicious experiments, upon the greatest variety of plants. But we need go no farther, than a common survey of our natural food. For Sugar is one of the principal qualities that enters into our bread, and is the sole promoter of fermentation. A principle of such prodigious advantage in qualifying every kind of Matter for this purpose. We might here enter into a large descant upon those kinds of Matter which yield this substance, and account for their several Actions. In this we might not only enumerate an infinite number of Vegetables, but many Animals likewise, might be included in the list. We might also not only explain the more

simple Taste from it, but might derive from this source many of the more compound and obscure. But it is not to our purpose to enter too minutely into such a detail, we shall therefore leave this subject to consider,

2. THE Bitter Taste: This may be more highly compounded, than the Sweet that we have described. Experiments indeed, have not been made sufficient upon this subject, and a pure Bitter is what we seldom find, and is very difficult to be procured. Many of the bitter plants will admit of Fermentation, and no doubt will yield a Sugar by proper experiments; hence we presume that this constitutes, in some measure, a part of their composition. Whether it is a Sugar in the mixed form in which we survey it separate, we shall not insist upon, but that many, if not all, the constituents are found in it, is very certain. Thus it was observed by Grew, that both the properties of Sweet and Bitter might exist in the same Plant; for he took notice that those

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Vegetables, whose roots are sweet, gave bitter leaves ; and that the Fig-tree, which bears a sweet fruit, bleeds a very bitter milk. The cause of the bitterness, however, seems to be an alkaline Salt, which is intimately mixed in the constitution. This Salt is in itself, perhaps, a Bitter, though different from what we find in Vegetables. But yet bitter Plants in general may be called Alcalescent, and this property may be so combined and obscured in their constitution, that like a Sugar in a compound Taste, it is not perceived, as it would have been separate and unconnected. There is an Acid likewise evidently existing in such Plants as contribute to a Bitter, and may constitute a principle of this Taste ; but it is so obscured by the alkali, that its properties cannot appear separate. An Earth may often give stability to the subjects of it, and an oil may in some measure take off an Acrimony which otherwise might prevail. The Perception that is produced upon the Tongue and Fauces, by bitter substances

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as it is almost opposite from what we mentioned before, so the affection with which we perceive it, is of the reverse to that of a Sweet. These substances are endued with a greater degree of activity, have less of an Earth to obstruct this property, and much less of an Oil to render them smooth and bland. In consequence of this, they are endued with very great powers, and excite a high degree of Irritation. No wonder then, if from these principles they become the source of a disagreeable idea. This experience almost always prove to be the fact, if they have a high degree of bitter; but if indeed in smaller proportion it may more easily be overcome*; and then they become pleasant and agreeable. This shews that the Pleasure and Pain of Perceptions, depend upon something more than the objects, and that by use we gain a habit of expelling what was before too violent

* This is the case with red wine and olives; nay, even a collection of bitter Plants made into a decoction may at length become agreeable,

lent, and gave us uneasiness. But besides this, a bitter Taste is very often accompanied not only with pungency, but with an astringent power, and here it becomes the cause of a sharp Pain, which belongs to the head of Sensations. As in a sweet Taste, smoothness gave us a pleasure of this kind, so here the roughness we perceive, is the occasion of the uneasy feeling. Another observation we may make upon this subject, is this, that as sweetness reigned in the greatest number of those Vegetables which contribute to our preservation and nourishment, so this quality subsists in those that have a less affection to our constitution, is a constituent of very active medicines, and often a principal ingredient of poisonous substances.

3. OF the Acidity that we find in objects of Taste, we can speak more particularly, certain, and precise, than of any other quality. This property, if pursued to its utmost extent, and examined with the greatest

greatest skill, has never been divided into a more minute substance; and from hence it seems to be the most simple of any we know in nature. There are indeed different kinds as well as degrees of it; but these vary more in the effects they produce upon other material subjects, than in the mode by which they influence the organ of Taste. To that they all contribute in the perception from which it is denominated, and differ only as more highly concentrated in themselves, or mixed and combined with extraneous matter, which weaken their efficacy. We may presume then, from this reasoning, that an Acid is a very simple Taste, and perhaps the most so of any we know. We may likewise proceed another step, and consider it as the basis of every other. We have already seen, that it enters very much into the composition of those, we have already examined, the Sweet and the Bitter, the most simple next to this. From hence it is easy to infer that other Tastes, which are only combined and made up of these, admit

mit of its presence in some degree. If we can rely in any measure upon a chemical analysis, we shall find that all bodies which can affect our Taste, yield it upon distillation. How this is procured, however in that process, is not to be ascertained, let us rather wave this proof, and judge of it by a more faithful decision.

THE chief subjects of Taste which we make ourselves acquainted with, are the vegetable Tribe, and in these we can admit of no exception to the formal appearance of this quality, at some time or other of their growth, or in some part of their substance. But all subjects of Taste are not vegetables, we perceive very distinct notices of this quality from animals likewise. Animal flesh constitutes a principal part of our food, and upon this account is brought under our cognizance. And we find it not only capable of effecting this organ of Perception, when pure, uncorrupted and fit for nourishment, but much more powerfully
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in a state of putrefaction, when this disposition is destroyed. The Taste however is very different, not only from an Acid, but from the other simple Tastes we have mentioned. This would seem to be an objection to the universality of this subject of Taste, if we had not experiments to convince us of the contrary, and very good reasons to suppose that it does exist in animals, if not in a formal, yet in a concealed manner.

IT is well known, that most of the animals of which our food is composed, subsist entirely upon Vegetables, and those in a young and living state, when they contain a very high degree of Acidity. From hence it may with justice be concluded, that this substance must in some measure be blended in their constitutions; and that notwithstanding we never discover a Perception like that of an Acid upon our Palates, it may really exist there, and give that zest which we so powerfully experience from our food of this nature. If, as we have
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determined before, this substance is a principle ingredient in the Tastes of Sweet and Bitter, it is not in the least degree improbable, that it shall occasion what we find in animal flesh. If the Palate was to be a judge of either of these circumstances, I am afraid we should be at a loss to determine, whether it existed in one of these more than the other. But we must confess, that it is more easily evolved from the subjects of those Tastes, the vegetable system, than from the animal constitution. However, many animals are found to yield both these Tastes in some part of them *; and from hence we may bring a collateral evidence of the universal existence of this substance. But we have a much stronger proof of the existence of an Acid in animal bodies, than any we have yet adduced; and that is, the constant degeneracy of Animals

* We may give for instance Gall as a Bitter, and Milk for a Sweet, without considering some peculiar Animals of the lower classes, which are distinguished by even these Tastes, as the Locusts, &c.

mals into Acidity. This may be necessary perhaps in some stage of every putrefaction; and may be always discovered at some time or other of this process—But if the means of a very quick putrefaction are in any measure prevented, by placing the substance in a cold and damp situation, we always find a high degree of Acidity, and such as is very sensible to the Palate. Besides this, the constant tendency in some subjects to produce an Acid in the stomach, even from animal food, and the acedcent process of Milk are, I think, very certain and unerring proofs of the existence of this substance.

FROM the whole of this reasoning then, I think, we may safely conclude, that an Acid is the basis of all Tastes, and that the rest are originally produced by the combination of this property, with some more inert substance. It may seem a paradox, that from the variety of two subjects there can be more than three produced; the two that
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are quite simple when separate, and the third when they are joined together. But this proceeds from a too mechanical view of nature. If we examine it by the test of experiment, and the true nature of combination, we shall find that bodies by this means, when joined, alter entirely the properties of each other, and become a distinct substance from either. Two bodies joined, make a third; this third, added to one of the others does not appear as having one increasing in power, but acts as a fourth quite distinct from either of the rest; add again the other body, it becomes a fifth, two of these fifths make a sixth; two of these a seventh; and so we may proceed almost to infinitum. After we have done this, we may subdivide them again, and form more combinations from that division. Let us borrow a little, in order to illustrate this subject, an analogy from the formation of words by the two first letters of the alphabet in this manner, 1. A. 2. B. these may be supposed as two simple bodies,

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we join them together, and they make a compound as AB. we compound that with the first, and make the word ABA. with the second ABAB. then we begin again, and make ABABA. and ABABAB. In the same way, we may divide these into several others; we take the fifth for instance, and divide it into three words, as BABA. BAAB. and BABAB, &c. If we suppose that bodies may be joined in this manner, and have different effects, as these words have in pronunciation, we shall then see what a vast variety may be derived from two simple substances only. These may most probably be imagined to be one simple active one, and another equally as simple, but quite passive; but what either of these are, no one can pretend to determine, and it is beyond the art of man perhaps to conjecture. Of this, however, we may be sufficiently certain, that an Acid is a body the most universally active of any we know, and is the result of the highest exercise of the art of Resolution. Farther
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discoveries may find this compounded of more minute substances, and we may go on for ever before we find the most simple bodies. The study of Chemistry, by which this must be elucidated, is as yet but in its infancy. Perhaps, when interested views are abandoned, and the spirit of enquiry into this kind of knowledge is better established, we may then have clearer light thrown upon this subject, and be able to declare with confidence, of what at present we are but just able to conjecture. In this situation we must leave it at present, in order to enquire into the nature of Acid with respect to our Perceptions.

* IT is not worth while to mention the general method of its acting upon our constitutions. It is certainly endued with a high degree of activity, and excites in consequence of it very violent Irritations. It sometimes occasions most acute ideas of sense, and is often so violent as entirely to

* Vide Essay on Medical Virtues of Acids.

destroy the animal Fibre. It would be needless after this, to ask whether we perceive it as agreeable or the contrary. It is only in a low degree, that we can take in any perception of it, and in those cases our ideas of it depend very much on the state of our bodies and the nature of the subject. In general, the common, though ever so much diluted, occasions rather an offensive than agreeable perception, we loath and are averse to it. But it is worth observation, that as when violent it affects our Sensations with Pain, so when not too sharp it is very agreeable to this affection. This is owing to an apparent cooling quality by which it relieves thirst, with which it is endued, and 'tis to this effect we must always ascribe this sense. This perhaps is an instance then, in which we may shew the difference between our Perceptions and more original Sensations; and for a proof, we may refer to every one's own feelings upon this subject. What we perceive of an Acid is disagree-

agreeable, but what we feel is the contrary. Is not this then a plain evidence how near these affections border upon each other ; and of our sentiments upon this occasion, that Perception is established upon an Irritation that is too quick to be perceived by sense. For here it is evident, that when the body admits of this affection, it is so slight as easily to be overcome, and hence gives a sense that is agreeable. In the case of Bitters, we joined a disagreeable Sensation and Perception together ; but then they proceeded from different qualities in the same subject, but this acknowledges the same quality, which differs only in the degree of power with which it affects us. The property of an acid Body, by which it removes thirst, is a necessary effect of its Acidity, although it is an object of Sensation and not of Perception ; but pungency and astringency, when they affect these distinct principles, are not necessarily joined to Bitters, but only accidentally as it were belong to them.

S E C T. III.

Of Smell.

THE organ or instrument of Perception, which conveys to our minds the notion of Smell, borders very near upon the last that we have mentioned, and the Perceptions we derive from each of them, bear a very great analogy to one another. This is often so apparent, that they are both imagined by some to be the same, and differ only in the parts of contact with the object. In the same manner it may be thought, as that Taste which is on the top of the Tongue differs from that in the throat, so that which is carried into the nose differs from the general Sense, and makes it appear as a distinct organ. But this is certainly not the true state of the case. Every one who consults his own feelings, is willing to witness against it.

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We can easily perceive, that the Tastes we enjoy in different parts of our mouths and fauces, have no resemblance to different Perceptions, but are evidently one and the same, only a little altered in their degree of action. But the sense of Smell appears to be excited by very different impressions, made upon a very different organ, which is affected by very different objects.

IF we examine into the structure of the two organs, nothing can be more different in the human body, the one consists of a number of glands, exhaling a liquid to dissolve the objects that are received upon it; whilst the organ of Smell is a membrane, covered with naked nerves, without any glands or ducts to convey a liquid from them. The means likewise of producing each of those effects is very different, the perception of Taste is most commonly made by liquid bodies, or reduced to that form; but the organ of Smell is fitted to receive impressions from those of a

solid or dry texture ; not indeed that it is insensible to liquids, but a solution is not necessary for this purpose. Besides this, there is required a constant influx and reflux of the Air, to convey more properly the odours of bodies to their proper place ; and for this intent, there are very long bony convolutions upon which the membrane is spread, contrived to make the Smell more universal, and to assist the access of the Air.

As Taste depended upon some particular qualities of bodies, by which that Perception was induced, in the same manner this organ requires some of those minute qualities, though of a different kind, in order to promote its exercise. Those qualities that are necessary to this Perception, are called odours. Qualities which are as universal in their nature as Tastes, and allow of equal variety with these subjects. But Smell does not depend upon one single circumstance, as was observed in Taste, viz.

viz. a difference in particular qualities, but admits of a property in bodies which may be called more general. This is volatility, or a disposition in bodies to leave the substances to which they once adhered, and be carried off from them. This property depends again, upon a mechanical minuteness, to which the particles of bodies may be divided. The division of which bodies will admit, is infinitely surprizing. For nothing is more common than to observe a mass of odorous Matter, endure this property for a considerable time, fill a very large space, and yet suffer no sensible diminution of its weight. This observation might induce us to imagine, that the odours of bodies are owing to some peculiar circumstances, which reside in their nature, and not to the minute particles which compose them. But we can have no Idea how great a mechanical division, can be made in bodies; much less, have we any authority to maintain, that a mere quality considered as such, and abstracted from its subjects,

subjects, can produce any effect at all upon our bodies. Fire or Light seem to be as much a quality of material substances, to be as minutely divided, and to extend their influence to as great, if not a more considerable distance than odours, or any other quality that we may suppose in bodies. The Sun is a body that has sent forth its rays of Light to an immense distance, when compared with the extent of any other quality, and yet, we have no grounds to maintain that the rays of Light are not material, or that the Sun is considerably diminished in its bulk. It is a very fatal error that mankind should dispute every thing that they cannot comprehend. All that the human capacity is able to effect, is, to refer to a few more general principles than what are evident to common sense, although built upon that foundation. In this however we shall soon find something or other that is unaccountable, and where we must put a stop to our researches. This is the case here: Because human art is not
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capable of dividing bodies so minutely, as the odoriferous particles of them require, we deny that it is within the power of nature to do it. But the minute division of bodies is not the immediate cause of their volatility. It only adapts and prepares them for this effect. Let us enquire therefore into those circumstances, which are necessary to remove them from their state of rest, and induce this consequence to take place. We have already seen, that many parts of bodies have an absolute activity, whilst there are others that are more passive and inert. It is in the struggle between these two, that all the effects in nature are produced. We have already explained the great Laws of Gravitation and Attraction from this Principle, and have carried it still higher, by supposing the Passive to be deduced from the Active. This distinction will be of no consequence here. We shall imagine some degree of combination to have taken place, and bodies to have become determinately endued with one or other of these

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these qualities. If in this case, two active and two passive bodies should meet, no effect will be produced, they will remain in equilibrio, and a state of rest will take place. If two passive bodies, in the same manner, should be opposed to one that is active, the same consequence will also be induced. But if on the contrary, two active bodies should entangle themselves with a passive one, it is necessary they should predominate, and give the communicated power, of which they themselves are possessed. Upon this foundation we presume to build our theory of Volatility, let us now endeavour to support it by facts, experiments, and analogy.

IN the general masses of Matter which we may observe, the passive powers abundantly prevail; and hence that resistance that is so common in nature. But in many other bodies, or particular parts of them, which are not so dense, or, in our opinion, not so passive, as the Air, the active powers
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are more free, and Volatility takes place. Besides this, the higher degree of resolution we perform upon bodies, and the more minutely we divide their particles, we bring these principles more effectually into play. From hence it happens, that the most volatile bodies which we know, are those that we have supposed the most simple in their nature, when disengaged from extraneous Matter. These are the strong Acids, of which that which is drawn from Nitre affords a very beautiful instance; and within these late years, a species of the vitriolic or spirit of Sulphur is discovered to be equally endued with this quality.

LET us now apply this doctrine of Volatility, to those particular qualities of bodies, which are called Odoriferous, and for this purpose, we must enquire a little in their nature. We have not arrived at such perfection, in ascertaining the particular distinctions of odours, as of Tastes. The only Ideas almost that we have annexed

ed to them, are from the modes by which they affect us with Pleasure or Pain, as an agreeable Smell, or one that is offensive; or else as borrowed from the affections of Taste as a sour Smell, an aromatic Smell, &c. Both these methods of distinguishing, are certainly improper; the first, because it refers to the caprice and humour more than the judgments of mankind, and the second, because it borrows from another Perception. We must be content then, with distinguishing Smells from the subjects in which they are perceived. But it is not necessary in this place, that we should enumerate the variety of these objects. It will be much more to the purpose, to endeavour to find out some general principles from which they proceed, and this may be easily done by considering some of those bodies that are the most active in this particular.

THE most volatile Body that we know, we have already determined to be some of
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the most highly concentrated Acids, such as Spirit of Nitre and Oil of Vitriol. These are in every circumstance calculated to affect our olfactory nerves, to cause very evident Irritations, and one would think upon these accounts, the most proper to excite the Perception of Smell. But they are too active and too subtile to become the objects of it, it is necessary a higher Sense should be excited by them ; and, in fact, we find a very acute Sensation to be occasioned. It will seem requisite then, from this consideration, that some Matter which is more passive, should enter into the composition of that body which is destined for this purpose. The most odoriferous body that we are acquainted with, joined with Volatility, is a Salt of an opposite nature from an Acid, viz. a volatile Alkali ; and this is most commonly observed to be an animal Production, and found but in very few Vegetables.

LET us consider a little how it is produced in the Animal. It is in that process which

which breaks down its constituent parts, and forms a new combination from what was before observed. In this new combination, we find no appearance of an acid principle; but that is no argument but that we may even account for this alkaline production from that source. Its formal appearance may be entirely destroyed, and a new one absolutely produced, as we often see in other subjects. It is a common maxim, that alkaline Substances are the direct opponents to Acids; and so they are when considered as particular Species; but this will not invalidate our opinion, that the constituent parts of one may enter indissolubly into the composition of the other. If this is granted, as that an Alkali is the product of an Acid, we shall then be at no loss to account for the rest of the Odours, we may discover in bodies, and to which they adhere as subjects. We have already advanced, that the most odoriferous body is the volatile Alkali, and that this is an animal Production. But we must consider,
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that the greatest number of odorous Bodies are of the vegetable Tribe, and where we can by no means discover the prevalence of an alkaline Principle. In all these, however, we may find both an acid and an oily Principle. From this then, in short, we are emboldened to conjecture, that the odours of Bodies in general, are occasioned by a solution of their oils in a volatile Acid, and that the whole effect is brought about in the following manner: The Air is perpetually replete with acid Particles, and these are always in a volatile state, the Body which yields an Odour, has likewise an Acid, but it is too much overcome by the oils to be any otherwise than latent, the Acid of the Air then joins with it, assists it in the solution of the oils, carries it up with it into that element by its Volatility, and when it meets with our olfactory Organs, affects them with the Perception of Smell. We need not explain here how this sense is produced; it may easily be imagined, from what we have already laid

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down. Every thing contributes to promote a high degree of Motion, in the minute Fibres of the organ, and in consequence of that, to excite such an Irritation as raises a perception of the object. The acid Particles of bodies, as we have shewn under Taste, are infinitely active; and the means which are afforded for the access of the Air, render them much more powerful; hence it is no wonder these effects are produced.

PLEASURE and Pain of the Perceptions, in this organ, are entirely adventitious, and depend so much on the particular objects from which they are excited, that we must enumerate the greatest number of them to form any tolerable judgment of these affections. For this reason we shall therefore leave any consideration of this kind to the suggestions of our Readers, and pass on to another organ of much more importance in the system.

S E C T. IV.

Of Sight.

THE Perceptions which we derive from Sight and Hearing, are more the objects of our intellectual capacity, than what we have already considered; and although, perhaps, they are not the instruments of the acute enjoyments of sense, yet they are the source of all that Pleasure that arises from our rational faculties. The first organ which we considered, viz. that of Touch, supplied in some measure the place of that which is the present object of attention, and no doubt was the source of great improvement to the mind. But Taste and Smell have been considered as more entirely sensual, as solely determined by external objects, and as of very little benefit in communicating any notions to our mental powers, but what belong to the

immediate gratification of the respective sense. As the Perception which we are now going to examine, is the most noble that we enjoy, as contributing to information and intellectual Pleasure, so the organ in which it is excited is of a most exquisite texture, and elegant workmanship. The Eye is almost a perfect piece of mechanism in itself. Simple, uniform and unconnected with any other, it comprehends the greatest variety of objects, and performs the greatest number of Motions. We need not enter into a detail of the different parts of which it is composed, or describe every function of which it is capable. We shall attend only to the immediate causes of Vision, the objects that give rise to it, and the motions that are required to produce it.

AT the first view of this organ and its different affections, it would appear as if no particular kinds of Matter were the objects of its exercise; but that it was rather
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dependent on the general qualities of it. Thus it might be imagined that what we judge of by this sense, were Extension and Solidity, the primary qualities of Matter, or Figure and Colour, the secondary ones. But all these qualities, might exist for ever in bodies, and the Eye be constituted upon the same, or even more perfect principles, and yet no notion be conveyed to the mind about them. This we often experience in the dark, notwithstanding that all these circumstances subsist in the same perfection. It is necessary then, that something else should intervene, in order to procure this perception. And this we see is always the case. Light is absolutely necessary for seeing, and it is only by bodies enlightened by the various modifications of this substance, that information is conveyed to our minds of them, by this organ. The nature of this substance, Light, has been much disputed, and it has been questioned whether it is a particular kind of Matter, or only a quality belonging to it. In many

places we have mentioned particular qualities of Matter ; but in all of them peculiar species only were intended. But here we must be more precise, and consider Quality as something to be abstracted from the subject to which it belongs. That Light is not a quality of this kind, may be proved from its Action, for no quality can act without its subject, and that Light certainly is capable of acting, appears from its influence on the Perceptions we derive from it. Besides this, every view of this subject will contribute to shew, that it is really a Body, entirely different from the objects we see illuminated by it, from which it may be abstracted, and to which it may be restored at pleasure. This may be proved from a variety of experiments, that may be made upon it. By these we may see, that it may not only be divided into peculiar parts, separate from each other, but is liable to all the general and particular qualities which other kinds of Matter enjoy.

NOTWITHSTANDING this, however, it will be very difficult for us to confute the notion of Light as a quality of Matter; and although it may be granted, that there is a body which accompanies Light, and gives it the force of its action upon our system, yet that still it does not constitute the body itself, but is only to be considered as a property which necessarily belonged to it, in the circumstances wherein we find it. This notion depends in a great measure on the fallacy of our Perceptions and Ideas. What is there, by which we can possibly judge of the nature of material Substances but our Feelings and Sensations, an action that is made upon our body by the impressions of other substances, and the resistance that we are conscious of in it. But in order to determine this question more exactly, let us enquire, by what Affections we ought to judge of material Substances. Shall we give up the whole of it to Sensations, and make Perceptions no more ac-

quainted with them, than as it confirms our common Feelings? Or shall we, as in this case must be supposed by the common understanding of mankind, make Sensations judge of the subjects, and Perceptions to judge only of their qualities? But how fallacious such reasoning would be, is very evident, we have shewn that both these affections are brought about by the same mode of Action, and that they equally depend upon an Irritation of the animal Fibre. To confirm this, let us examine a little what would be the consequence of such arguments, if we refer them to the different organs that we have already mentioned. Those bodies which we have found to be the cause of Smell, or of Taste, would no longer exist distinct as such, but would be reduced to a mere circumstance or affection, that might belong to any kind of Matter whatever; whereas we have shewn that the most perfect bodies in nature, appear to us under that form, which the most perfect Taste represents.

SIMPLE Matter is so involved in its qualities as they are very improperly called, that we shall never be able to form an accurate judgment of it. Thus Extension and Solidity, without which our Ideas of Matter must cease, are called Qualities, as well as Heat, Light, &c. The only distinction which is made between them is, that the one sort are supposed to be primary and necessary, the other secondary and contingent. But I would beg leave to think, that the secondary qualities as essentially belong to particular kinds of Matter, as the others do to this Substance in general; and what is secondary to body in that general view, is primary perhaps to others, which can no less exist without it, and where the former cannot be perceived. An instance of this we may give in Light, the body now before us, where we are not in the least sensible of Solidity or Extension, but we are evidently conscious of its secondary quality, which in this case becomes primary, is enabled

enabled to act upon us, and is as much Matter as any other with which we are acquainted. I cannot comprehend rightly this distinction of qualities into primary and secondary. It very much puzzles the subject, bewilders the imagination, and leads to Scepticism. Matter, when considered according to its qualities, is only an assemblage of them, and independent of their influence is nothing; and qualities are nothing but a term by which we distinguish the particular kinds of Matter from each other. Would it not be much better to distinguish Matter not by its qualities, but by its forms? This would give much more stability as well as truth to our reasonings, would place the secondary qualities upon their proper foundation, and make them more clearly understood than they are at present.

To confirm these arguments, it may be necessary to examine them, by means of our senses, and see how it is, that these organs become acquainted with different kinds of

Matter. By our general feelings or sensations, we judge of resistance made to our body; by our Touch we discover, that this is made by a solid body; by our Taste we discover that it is acid. But does not the latter inform us as much of the existence of Matter as any of the others. They acquaint us with its general form and contents, but the other informs us of that peculiar kind of Matter, which affects us, and instead of being less instructive, it is more accurate. There may be a difference however pointed out in this respect. Our first Ideas of Matter arise from resistance, the information we receive from Touch confirms this; but that of Taste gives a new Idea of its own. Besides, the sense of Touch, lends its assistance to confirm more particularly the idea of Solidity, which is the immediate object of it. But the other Perceptions, confined to their own objects, only give information of the secondary qualities or particular forms of bodies. From this circumstance then it is, that because
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the idea of body, as solid or extended, is not immediately suggested, that we have room to imagine that it is no body at all that is presented to us. But these are not such determinate marks of Matter, but that they may seemingly be obliterated, and if any other quality of body subsists, such as a power of inducing Action, I think it will be sufficient to determine its presence.

BUT to return to our proper subject. In our consideration of Light, as a particular kind of Matter, or as a body distinct from every other ; we must set up our Perceptions as a standard of this knowledge, and must be obliged to make the organ of Sight, to be as true a test of it, as any other means that can be employed for this purpose. But we must support our arguments upon this foundation, that the best means we have of judging of Matter, is by a power in it of irritating the animal constitution, that our common feelings or sensations judge of the force of the action, and that
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our Perceptions determine the peculiar kind that affects us. The organ of Sense now under consideration, is the most extensive in its views of any other, as it can form an idea from the abovementioned process, of the general form, and shape of every body. But the peculiar kind that affects it, and which creates an action in the organ, is something very different from the bodies which it seems to see. These bodies never come within its view, but it is the Light which envelops their surfaces, and which strikes upon the Retina of the Eye that creates what we call Sight. We shall now endeavour to examine a little more particularly into the nature, properties, and different modifications of Light; by which we may perhaps confirm our former reasonings, and be more ready to explain the different actions which it excites.

It is very natural for the major part of mankind, accustomed to reason, in the formal manner of the schools, to think it
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necessary when we are going to explain the nature of any body, to determine its shape and figure and demonstrate its Solidity and Extension, those necessary attributes of material forms. We shall examine therefore these qualities, and see in what respect Light may be acknowledged to be endued with any of them. In the first place, with regard to figure, it is impossible we should judge of that which belongs to this substance, because the sense which discovers it in any other body, becomes acquainted with it by means of this substance alone. It appears to be a mould in which all other figures are cast, or a cloathing which covers every part of them, and upon these accounts can have no determined shape of its own. Neither when it is abstracted from bodies, can we ever pretend to assign to it any peculiar form or construction. In the next place, Solidity, a property upon which forms are of necessity founded, can never be demonstrated to be in Light. This quality is determined by our Touch as well

as by our Sight, but we can never pretend to say that Light is determined by that test. It is the object of this organ alone, and can bring no other to corroborate that evidence. It might be imagined however, that if we would allow divisibility to be a test of Solidity, we might easily discover this quality in Light. Sir Isaac Newton was the Father of this kind of Philosophy, and discovered many hidden treasures of this valuable substance. But he himself might be deceived if he ever thought he divided a simple and single Ray of this substance in his optical experiments. For how many might be included in that space which he brought under his inspection, is impossible to say. We have no proof therefore of its Divisibility, nor in consequence of Solidity from this source. We have nothing to confide in upon this subject, but this common reasoning, that if it is a body, it must be endued with Solidity, because we have no notion of a body's existing without this essential and primary quality; or from another

ther property as essential to Matter as this, which we are going to consider.

THIS is Extension, of which no one can in the least doubt but that Light is possessed in a very eminent degree. Perhaps in this quality, it exceeds every other body in nature, and yet from this source, if it was not for the consequent Action it produces, Light might be considered as a secondary quality. But it is necessary, that for this purpose, it must be abstracted from the body to which it seems to belong, and the whole space between our Eyes and the body must be filled with it; for unless this was the case, the body itself must strike upon the Retina, to create vision, and not the Light that proceeds from it. This is a high proof then of its Extension; and from this we may easily deduce its Solidity, because the one almost necessarily implies the other. Having then shewn that Light is possessed of the primary and essential qualities of Matter, let us now proceed to
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examine its particular nature : In order to do this more completely we must consider its production.

THE great connection which is often observed between that power which affects us with Heat, and that which produces Light, has led many to imagine, that they are both the effect of the same principle. Thus it has been taken notice of, that Light conveys sometimes a degree of Heat, and on the contrary, that Heat is much oftener accompanied with Light. The answer that has been given to this supposition, is what is very obvious at first view of the subject ; that they do not always accompany each other, but that they are as often separated as connected, and that where the greatest Light is evident, no Heat is perceived, and where the most intense Heat is acknowledged, Light is not in equal proportion. That method of reasoning, which considered these substances, as mere qualities only of Matter, was an error that un-

avoidably misled those Philosophers who have attempted the examination of this subject. We have already endeavoured to prove that what produces Heat is a body, and that the Matter of Fire is the most universal and general of any other kind, that it enters into the composition of all others, that it is evolved from them by Motion, and in this exit it occasions Heat. We are now to examine into another body equally as subtile, but not so destructive. It acts only upon our constitution, and that of Vegetables, and although we experience from it something very different from Heat; yet we may indulge the supposition, that both the effects proceed from the same cause. Let us to enforce this argument, draw a comparison between them from a few of those influences, by which each are produced.

1. THE first and most common production of Light is from the Sun, which is continually emitting Rays from its substance, and enlightening all those objects
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which are discoverable by our Senses. This is its most common source, and in respect of its superior influence, we may pronounce it the universal Parent of this substance. That it produces Heat likewise is equally evident, but it is from some very peculiar circumstances that this is effected. These may depend perhaps upon the condensation of its Rays in the common atmosphere which surrounds us, whilst, if left to themselves, this effect might not be produced by it. We cannot bring a more beautiful instance of this, than in the great advantage we derive from speculums. This piece of Mechanism can produce the most intense Heat, by an accumulation of Rays which are innocent when distinct, or even when reflected from other bodies.

2. A SECOND means of producing Light, is from the inflammation of burning bodies, and here no one will dispute the presence of Heat. But let it be observed that the greatest Heat, in this case, is not observed where there is the greatest Flame. It is

only a free expansible vapour of bodies which admits of illumination, whilst the body itself continues in a darkened state, although heated to a much more violent and excessive degree.

3. ANOTHER means of producing Light is from certain bodies of a particular nature, which appear spontaneously covered over with an illumination in the dark. These are of three kinds; the first natural concretions, in the bowels of the earth of a saline nature; the second, the effect of a peculiar animal process, which is observable in Glow-worms and many kinds of fish; and the third arises from putrifying Substances both of an animal and vegetable nature. In all these it must be confessed very little Heat is to be perceived, but yet that they all partake of it in some degree is equally certain. All saline bodies are found to contain a considerable degree of Heat when mixed with each other, and one of the most luminous is found to be a selenitic salt, a composition of an Acid and
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an Earth, and this Salt is the basis of many warm springs. There are no Animals but what have some degree of Heat in them, and although the Glow-worm appears to us colder than our bodies, yet there may be something in its constitution which may evolve its natural Heat more perfectly than in other Animals. The Light, which proceeds from putrefaction, in the same manner may be said to arise from a degree of Heat, which may be observed often very violent in substances under that process; or it may proceed from certain Animalculi of a luminous nature, that make putrid bodies the Nidus of generation.

4. A fourth manner of producing Light is by the power of Electricity. Of this indeed we have so few regular experiments, and so little has been advanced in a systematical manner upon the subject, that no just conclusions can be made upon it. We do not however find any great Heat, from what is called the electrical Fire, and yet it is possessed of many burn-

ing qualities. These are most evident in the highest degree of Electricity, viz. in Lightning, whose effects in this way are well known. To the means of producing Light that have been already adduced, we may add several others, as the motion of Quick-silver in an exhausted receiver, and the Trituration of certain bodies, in all which it is excited by one of those means that likewise produces Heat and Inflammation.

WE have shewn then, a number of instances, in which we see similar effects produced from the same causes, in some more violent, though in others less considerable. We must now enquire whether this reasoning be satisfactory, and in what manner the different circumstances are to be compared together. In most of the parallel instances we adduced, there was no proportion between the two effects, except in one, which indeed was the most powerful, viz. the Rays of the Sun, especially when

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condensed in a Speculum. Let us observe then the effects of that experiment, where pure Light is apparently brought to produce the most violent effects of Heat. This is done merely by condensation, or accumulating of the different Rays together, and making them to act with a superior force. In this case, Light is produced as well as Heat, but with this difference, that a body interfering, the Light is absorbed though the Heat continues. From this it will evidently appear, that Light dwells upon the surface only, does not enter into the minute parts, and is to be referred to our senses alone. Whereas the effect it produces upon bodies, though without that appearance is very violent. Again, Heat is produced in the strongest manner in the most dense bodies, and where there is the least surface. These circumstances however, apparently so opposite to each other, are far from invalidating our opinion upon these bodies, which we shall now deliver more explicitly.

LIGHT and Heat are not be considered as different effects or qualities, but more properly as cause and effect. Thus Light is supposed to be a body that resembles the most of any the Matter of Fire, which we imagined to be the most subtile and active in its nature. From this view we shall find that the different circumstances may be easily explained. Heat is always found to be in proportion to the density of bodies, and this is because the Matter of Fire finds greatest resistance, when this is case, and in consequence induces the greater Motion; but as soon as it has reached the surface, the Heat lessens, there is not so much intestine Motion perceived, and it puts on the natural appearance of Flame. This agrees exactly with the phænomena of Light. When Rays are accumulated they make a dense body, and cause a heat, and in this case the illumination is not equal in proportion; and besides, if it enter the body it occasions as intense a Heat as any other

other cause. In general, it dwells about the surface, and then it may be considered as a modification only of the Matter of Fire evolved from the body, only infinitely more active, subtile, and pure. From the whole of this it will appear then, that Light is the Matter of Fire, rarified too much to produce Heat, and that this quality often proceeds from Light, condensed to a very high degree. The reason, perhaps, that we do not see Light and Heat correspond to one another, may be determined by a variety of circumstances; but particularly by this, that we cannot absolutely ascertain the exact degree of Heat that is excited in bodies, or that nature of the Matter of Fire, by which its more easily evolved from some bodies than it is from others.

It may be objected to what we have said, that such a powerful active body as we have imagined Light to be, would be seen to produce very violent effects of its own accord; whereas it is innocent and
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harmless, both to our Perceptions and to other parts of Matter. This is owing entirely to a fallacy in our common observations; and besides, does not correspond with our method of reasoning upon the the subject. Light is not so innocent, as might at first view be imagined, it acts upon us in a slow and determined manner, and rises gradually from darkness to its highest lustre. By this means we become enabled to re-act with ease upon the impressions that it makes upon us; but if we were to be translated very suddenly from one of these states to the other, we should find this body infinitely more powerful, than we could sustain. But waving every consideration of this kind, we do not pretend to infer from what we have said, that a state of the highest activity is a state of the greatest destruction. This circumstance must be determined from Resistance, and this will depend on a combination with another body, whilst the same activity subsists. Thus we find that Friction begets

Heat, not in proportion to the velocity alone, but to the quantity of Matter joined with it. Where activity is sufficient to overcome the resisting Matter, which will be in proportion to density, the more powerful will be the effects, but where it meets with little Matter, it can have no possible effect. This will admit of very judicious reasoning; for Activity, let it be ever so violent, can have no power but where there is something for it to act upon, and those bodies it meets with, when easily overcome, occasion a less violent Action; whilst in bodies that form a great Resistance, if it is able to overcome them at all, must effect it with great power and force. From hence we may imagine that a destructive principle is not in the least necessary to the Activity of any body; and this is the reason why Light is generally so innocent; and yet upon particular emergencies, it may become the universal destroyer of all nature.

NOTWITHSTANDING what we have said, however, in this disquisition on the nature of Light, we may still imagine, that as it appears to us, it is not that simple element which we may imagine the most pure in nature, but that it is in some measure a compounded body. The foundation upon which we ground this idea, is the division we may artificially make of it into different colours, which lie blended in its substance. Whatever may have been said concerning Colours as different Modifications of Light only; and that bodies are only possessed of them as they are disposed to reflect particular Rays; yet I am still of opinion, that there is something very particular in their composition, that inclines them to these appearances. Colour is no more the object of Sight, than an Acid or any other taste is the object of its peculiar organ; and I see no reason why peculiar mechanisim should influence the one, any more than the other. A just reasoning,

soning, founded upon common sense, inclines us rather to suppose, that there are certain parts of Matter which are endued with one colour, and others that are possessed of a different one; and the peculiar texture, which every body must have upon this account, has never been demonstrated.

WE do not know what Matters may be mixed with Light, in its approach from the Sun to sublunary bodies, and how upon the application of a prism, it may be inclined to reflect the colours of each. Nor yet can we suppose that every thing that we see, are influenced by prisms, or any such circumstances in the air, as to make them put on their peculiar colours. At the same time, there is nothing incongruous in the supposition, that all bodies shall be induced by properties corresponding to their intimate nature, always upon the accession of Light, to appear with a particular colour; in the same manner as they

offer a peculiar taste, when presented to the Tongue. In some cases, we often see some particular kinds of Light, correspond to those other principles of bodies, and particularly in that effect of altering their colour. Thus, some experiments upon the electrical fluid, have discovered in it a quality very nearly approaching to an Acid. This has not only been perceived by the taste, but by the change of the blue juices of vegetables into a red, the true test of this quality. No experiments have been made upon common Light for this purpose, neither do I believe that it possesses such a power; but yet where we have discovered it, it is sufficient to shew that other Matters are often joined with this body. Sir Isaac Newton first made those notable discoveries, concerning the division of Light; and from hence it has been always held as an established maxim, that Colours were Modifications only of it. His experiments were infallible indeed as far as they went, and carried with them the certainty of demon-

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monstration, with regard to prismatical observations. But whatever extended further than this, was entirely conjecture; and notwithstanding the Light taken into a prism, and the colours refracted by it, obscured or destroyed that which was natural to a body, yet it was no more than what every common Dye would do, where there is no influence of this kind. But at that time philosophy was too mechanical, and all the qualities of bodies were attempted to be explained in the same manner. With justness and reason this method of philosophy has been exploded in others, and it is hoped that in future time, some reigning principles will be discovered in bodies which shall determine their Colour also. At present, it would be inconsistent to offer even conjecture upon this subject, no experiments of any utility have been as yet brought to light, any more than as they respect particular arts, and the imaginations of authors are so frivolous that we must at present leave it in that obscurity
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in which it is involved, and which by any further reasoning of our own we might only serve to promote.

LIGHT then, being considered as a body of a very subtile nature, and very powerfully active; let us now attend to some of its effects on the human body. We need not in the least doubt, but it is enabled to irritate the animal Fibre; both as it proceeds immediately from the object of its production, and as reflected from other bodies. In consequence of this Action, a perception is induced, agreeable to our former notions of the origin of this affection. But let us examine a little more particularly the form of the organ on which it acts, by which it is adapted to this purpose, and the method by which these effects are produced.

THAT part of the Eye, where the Perception is immediately excited, is a membrane spread over the inner cavity or chamber of this body, composed entirely of
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nerves of the finest texture and most minute divisions, and is of the most delicate frame of any part of our constitution. The Retina, the name which this membrane obtains, by this means becomes exceedingly well calculated for the access of a very slight Irritation. But notwithstanding this, Light is endued with so little force to excite an Impression, that the Rays are obliged to be exceedingly condensed, before they reach the immediate organ of Perception; but then by this means it enjoys a double advantage, not only in condensing the Rays to make a sufficient Irritation, but in taking in a very large picture, by which the greatest variety of objects shall be perceived.

From these circumstances then, we are enabled to explain the nature of Vision, upon the principles which we have already laid down concerning the nature of Perception in general; but before we finish this subject, it is necessary we should take

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notice of two circumstances, which have very much puzzled Physiologists, and must interfere with every theory upon this subject. These are the inversion of the object, and the impression upon two organs at the same time. Many have been the conjectures how these are induced, but they have in general referred them to a principle too mechanical; I imagine there is no occasion for this, and we may probably explain them with greater plausibility upon the reasons that we have laid down in this Treatise.

WITH regard to the former, it might seem at first view that as the Irritation is made inversely, that the Perception should correspond to it, and be so likewise; but let us reflect a little upon this subject: We have already insisted much on a distinction between Perceptions and Sensations of this nature, that one relates entirely to the mode of Action, whilst the other refers to the object likewise. If Seeing were a Sensation,

sation, and it was by this Affection, that our judgment must be determined, no doubt but the object would appear to us as painted on the Retina, but as it is a Perception, that reasoning will not hold good. For by this Affection, as we are not conscious of the Action, but of the thing represented, we must judge of its situation, and of its distance, by some further act of the Mind. We can hardly say how it is children or even brutes perceive objects; but utility and long use will direct them to perceive things aright, although they have no intellectual faculties to form a proper judgment. For there is a great difference between a kind of natural judgment, that we may form with very little act of the Mind, and that superior kind which requires the greatest exercise of mental powers. It is by this means, most probably, that we attain to the knowledge of the distance and situation of bodies, and mere Perception such as we have determined it, may be imagined

imagined not to have these things for its object.

THE same reasoning, however, will be very fallacious, if we extend it to double Vision. The other was established upon the Object, and not upon the Action, but this relates to both of these, and would be almost the same, if by Sensations even, we should attain to the power of Perception. Every act of the Mind, of whatever kind it is, must be performed at a particular time, peculiar and confined to itself. Besides this, the consciousness of every action, and the instruction of every body must be conveyed to us distinct, to make us sensible of them; and I imagine that succession must always be perceived, in order to raise in us two distinct ideas. Where an object then offers itself to our Sense in different parts of the body, if it is done at the same time, it will appear simple as it is; but if there is succession in its Action, it

it must appear double, because it conveys to our Minds two Ideas*. In common Vision, we have one object presented to two different organs at the same time, and it appears to be one for the reason I have above described; but if we interrupt the Rays of Light by interposing a body in such a manner, as that it shall enter but one organ at a time, it will appear double, because we create a succession in the Perceptions. This is always done in those experiments that are made to occasion double Vision. For in that case, a small hole is made in a piece of board, by which a sufficient number of Rays cannot come to both eyes at once, but are prevented in the one whilst they gain access to the other.

WE shall have occasion to say but little concerning the Pleasure or Pain that result

* This may be illustrated from another sense, viz. Touch, by a very simple experiment, which has often been observed, viz. putting any body between our fingers, so as to make it touch in different points, and it will appear as if we had two bodies there.

from the objects, that are offered to our Sight. Every one is conscious how great a source they are of these Affections, but yet they seem to be too intellectual for our present purpose, and to be determined by a higher power of our Mind. But we may experience from this organ something of Sensation, and although there are few instances, where in the common occurrences of life, Light can produce any sensible Pleasure or Pain; yet disorder will so influence the Retina, as that an impression on this body shall become entirely offensive and affect us with very great sensible uneasiness. In this case, it is worthy of observation, that it does not act as Light, by creating too great a glare, but evidently conveys the idea of a Stimulus, or a body impinging upon us by a mechanical power. This is a farther confirmation of the difference we pointed out between our Perceptions and those effects of which we become sensible; and besides this, it is a proof of that remarkable Affection, either of our mental

or corporeal faculties, which disposes us to be more sensible of impressions at one time, than we are at another, and which makes simple Irritations to become violent acute Sensations.

WE have seen then that Light is a body, which in the act of Vision irritates the Fibres of the Retina, and occasions the Perceptions of objects illuminated by it. Let us now see if we cannot explain some other Phænomena of the Animal Constitution, from these, or at least other principles of the same nature.

1. LET us endeavour to examine into the phænomena of Dreaming, a subject that has puzzled many of the best Physicians as well as Philosophers. How it is that the Body be disposed to that activity and vigour, which we always find it enjoy in a watchful state, is not so difficult to explain, because it appears to be the natural and original state of Man; but how it is that we

come to put off that disposition, to lock up all our Senses, and involve ourselves in a dormant inactive situation, is very extraordinary and remarkable, and is very difficult by any tolerable theory to investigate. The final cause indeed readily presents itself to us, viz. to promote our vital Actions, whilst our sensible organs are lulled asleep. But yet we see that even in this state, a Phenomenon appears which seems to exercise very much our sensible as well as vital Actions. This is *Dreaming*, of which the best definition that can be given, is, that it is the apparent means of exercising our sensible powers, while the organs are deprived of any external impressions, and of their usual faculty of acting. We think that we are in the possession of every enjoyment of Sense, and exercising the same professions as in real life; whilst the whole is an imaginary fiction, and we are engaged in no Action at all.

THE opinions of Philosophers in all ages upon this Phænomenon have been many and various. It was a remarkable subject, and every one was desirous of exercising his abilities and detailing his sentiments upon it. It is entirely, perhaps, a subject of conjecture, and it is wisely contrived that we shall enter but superficially into such disquisitions. If we take up the subject independent of any system, and attempt to explain it from its appearances only, we shall be more liable to be deceived, than if we deduce it as a consequence of the general Affections of our constitutions. For as an animal Action it partakes no doubt of its general principles, and acknowledges the same moving power as any other.

IT was an antient opinion, and one that has not been neglected by some modern writers, that this affection Dreaming was influenced by Dæmons, evil and good Spirits, who struggled with one another, either

to please and divert, or to torment and distract us in a state, when our principal faculties were locked up and deprived of Action, and we were disqualified to resist or oppose their power. It is not our business to enquire into the nature and influence of these Spirits, but whatever view we take of their Action it must be considered as belonging rather to our mental than our corporeal faculties. The scheme that has appeared the most plausible, and which carries the greatest conviction along with it, is, the supposition, that it is the exercise of our mental Faculties, whilst those that are merely Animal are incapable of any Action. This reduces it to that involuntary power of thinking which every man enjoys in great perfection even when awake; and make the reveries of a man awake to be the same with the Dreams of a man asleep. We shall offer some few objections to this scheme, and then endeavour to explain the method by which it seems to be produced.

1. IN the first place we may observe, that our Thoughts whilst awake, if they are of this kind, are engaged in a particular train, from which we never deviate till the chain is broke by some unforeseen interruption; and that it is only those few who have spent the greatest part of their time, in the most strict study and contemplation, and that on most abstruse subjects that are liable to this Affection; but the same cannot be said of Dreams, for nothing is more contrary to this, than the common mode of thinking that we employ in them, nothing more fleeting than their objects, and nothing more transitory than their pursuits.

2. IN the second place, our Thoughts in deep study and meditation are not only regular and consistent with themselves, but they are conformable to the general informations of our Senses. We can never, by all the Reveries that are possible, entertain

tain the idea that we are in different company than ourselves, and that we are in the enjoyment of any scene of life, but what at that time we really experience. But in Dreaming, such inconsistent ideas are perpetually obtruding themselves upon us, and make the chief subjects of our contemplation.

3. IN the third place, the subject of serious Meditation and Reverie is most commonly some abstruse point of science, and it is most likely that the Mind would always be engaged in such contemplation, if left to itself; but in Dreams, the most light sensible and diverting scenes of life are represented. Solitude is pleasing to a man in his senses, and it is this perhaps that may dictate to him whilst awake such Thoughts as are most serious; but in Dreaming, Solitude is seldom observed, we are surrounded with variety of company, and it is gaiety and mirth, or else some most interesting scenes that employ our attention.

4. In the fourth place, we do not seem to have so high a degree of moral delicacy in our sleeping as in our waking hours. But if Dreaming be a mere exercise of the Mind, abstracted from the Body, one would think the contrary should take place; for no man, let him be ever so much devoted to sensual objects, but some time or other has a regard to the affections of the Mind. And this must happen when most divested of objects of Gravitation, and most abstracted from sensible powers.

5. In the fifth place, bodily Affections and disorders very much disturb us in our Dreams, and the greater stimulus employed, as well as the greater velocity in the circulation, very much hurry and disturb our Thoughts, represent to our Minds frightful and horrible objects, and raise the most tumultuous passions. This could never happen, if Dreaming proceeded entirely from an exercise of mental powers, be-

cause we often find, the greatest tranquillity and ease of mind in those persons, who are the most disturbed in their sleep, and have the most affecting Dreams.

FROM these arguments it will appear, that the Mind in its separate state, is not sufficient to account for this Phænomenon, but that some corporeal Affection must have a share in the origin of it. The Body however in the most common cases is free from disorder, that shall affect us with pain, our Senses are all locked up and disqualified for use, we are sensible of no Irritations, and we perceive no peculiar Perceptions from any objects. How then shall the Body become capable of this effect? We have already determined that the sense of Seeing is produced by Light, that this is a Body, and in consequence of that circumstance, it produces this Perception. But suppose any other Body was to affect us in the same manner as Light does, would it not convey the same Idea or Notion to our
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Minds, that this Body did when it was present; for as we have no notion of Bodies but from the Ideas they convey to the Mind, whenever an Action similar to what the Body occasioned, arises, we must necessarily refer it to a cause of the same nature. Thus there is only one Body from without that can make an impression upon the organ of Sight, and we are accustomed to no other, but if from any internal principle we should perceive any thing in that place, we should immediately refer it to the general object which causes Ideas. But simple Light conveys only one simple Idea; and this can make but a small impression: its more general Action is in reflection from other bodies, and though still it acts as Light, yet it would convey no farther notion to the Mind, than that of this simple Body, unless we refer to a higher power of the Mind. We must bring in then the assistance of Memory and Judgment, to inform us of the particular species of beings, after the impression is made upon the organ.

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These acts of the Mind, rouzed by this power, produce from Recollection many of the fanciful ideas and odd circumstances that we see produced in Dreaming; and this may be the cause why this affection is always an act of Reminiscence.

THAT there is a Stimulus present in our Bodies at all times, is evident from the continual exercise of the circulating powers. Of this indeed in common causes we are never sensible, not even in our sleep, but that we may have a Perception of the irritating Power, as the blood passes through the sensory organ, may be evident from this reasoning. We have already observed that a greater degree of Resistance is required to occasion a common Sensation, than what is required for the Perceptions we derive from the organs of Sense, and hence it is more easy to perceive than become sensible; and we may conclude, that simple Irritations may very easily, upon the least Resistance, be so heightened, as to be perceived
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in respective organs. Now we know, that the whole Circulation is greatly heightened in the time of Sleep, the Pulse is quicker, the Respiration more uneasy, and every Secretion performed in much shorter time. From these circumstances then, why may we not imagine, that the blood passing through the Organs of Sense occasion, a Perception in them similar to what was produced by their proper objects, and occasion this Phænomenon? As nothing, however, can be more various than the the objects which are presented to us, it is necessary that Memory should in great measure supply their peculiar forms. This may arise sometimes likewise from some accident, or unforeseen circumstance, which may make our Dreams so complicated and irregular, as we often find them.

As most of the objects which we perceive in Dreaming, are such as belong more particularly to our Sight, we have chosen to give this discussion of it here; although at

the same time every one will confess that all the other Senses have a share in this Phænomenon, when they represent all the Perceptions that are excited in their proper organs, when at liberty to be acted upon. This may be true, not only of Perceptions, but even of Sensations also. These are often felt in the most lively manner when asleep, sometimes indeed occasioned by the real causes of Pain acting in the body, but most commonly from a vague Memory of such accidents as might have happened to us, occasionally before. When indeed all our Perceptions, are brought forth to action, it is no wonder that our Imaginations should rise to so high a degree as to exhibit to us different Sensations, even when no cause of them should exist in the Body; and it may be proper perhaps to advance here, that some of the Perceptions even may arise from the same source, when assisted by every other. This may be done, I think too without derogating from our former opinion; for we do

not desire by that to destroy the force of Imagination, even when we are asleep, to obscure any exercise of the Mind at that time, or to imagine, that it ever requires that state of inactivity which is necessary for the body. The whole of what we desire to establish is this, that as when awake the first Actions of our Minds are derived from our Perceptions; so when we are asleep, the first origin of Dreaming is to be derived from this seeming representation of these Perceptions, by a Stimulus operating upon the organ.

FROM what we have advanced, we may be prepared to explain some of those circumstances which occur in Dreaming, and determine its nature.

1. IN the first place then, we may observe, that when the Mind does not dream, it exercises that contemplation abstracted from Sense, which we experience in a Reverie. We do not, however, remember

Thoughts from this source, no more than whilst awake, we remember the effect of that close Meditation. We sometimes have a notion that we were contemplating a subject of an extraordinary kind; but of what it is we are entirely ignorant. Memory is so dependent upon sensible circumstances, that where these are wanting, there are but few that can exercise it with any great vigour, and hence it is no wonder we should often lose those thoughts that are unattended by something of this nature. May not this be the case with those persons, who sleep and imagine they never dream? They forget the subjects upon which they were employed, and very often that they enjoyed any of their thinking powers. I would gladly pay this compliment to Mr. LOCKE, who imagined that the Soul slept during the Rest of the Body. This opinion, was founded upon his own observation: He found in himself an inability to remember his sleeping Thoughts, and even that he enjoyed any at all. This led him to that
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conclusion. Every one will acknowledge that he must have been a very close Thinker, and his thoughts were such as I have excepted to as constituting Dreams. No wonder then that by this constant Action of the Mind he should exclude all the impressions of sensible objects, and disqualify himself from this power.

THAT our sentiments upon this head may not seem entirely improbable, let us reflect a little upon some of those circumstances, that may happen to us whilst we are awake, and engaged in a Reverie. Persons of very intense Thought, and what is called Absence of Mind, being suddenly roused from a state of Meditation, which they have been observed to enjoy; upon this accident, have not only forgot the subjects of their contemplation, but even that they were thinking at all, and the only sensible object they possibly could be concerned in, which was Time, has been absolutely forgotten by them. When we see,

therefore, that our Thoughts are so powerful as to overcome our original natural Perceptions, in a state, when the organ is most perfect, and objects are perpetually imposing themselves upon us; it is no wonder that to such Minds the mere representation of this affection, should be lost in oblivion. Besides this, we may observe, that as the sudden access of any object even when awake, destroys the effect of such meditation; it is not surprizing that the sudden impulse of waking from sleep, should destroy those thoughts, which if remembered, would constitute a Dream. These sentiments are so far from determining the Soul to sleep as well as the Body, that we may see from them that it is the most active and vigorous at that time, and notwithstanding no new Thoughts are suggested to us, we may derive this utility from them, viz. the prescribing the mode in which we ought to think, and enjoying the highest exercise of mental Powers. They may likewise suggest to us this reflection,

fection, that this scheme is so far from destroying the notion of immortal Life, that it establishes its truth, upon a rational and intelligent footing, entirely independent of any immediate sensible object, and consistent only with intellectual powers.

2. FROM what we have advanced with regard to Dreaming, we may deduce in the second place the confused and disturbed nature of our sleeping Thoughts. Engaged only in the mere objects of Sense, without any determined patterns, they are influenced by a vague uncertain Memory. In consequence of this we become acquainted with strange and unaccountable Figures, and are interested in the most fleeting and transitory scenes of life ; and as in the Organs of Sense, Perceptions are observed, which when they are capable of exercise, no longer produce any effect, so in different parts of the body Irritations are observed, which when we are awake, lose the impression of the object by which we

are variously affected. This shifting from one part to another, or in different circumstances, occasions that hurry and disturbance, that is to be observed in our Dreams, and thus it happens, that we seldom in those cases, form any perfect Idea in our Minds.

WE have upon the whole then, formed a conjecture that Dreaming depends upon a power in the circulating fluids, of stimulating our organs of Perception when asleep and unfit for use. But they may produce an effect of this kind, even when we are awake, and the organ is in perfection. When the Stimulus of the vital fluids, is become very violent and excessive, it overrules the force of the natural object of Perception, although it is not yet powerful enough to cause a direct Sensation. In consequence of this, different objects will be presented to us, than what are impressed from those that are external, and a depraved and confused Memory will suggest some accidental

cidental circumstance to our Minds. This representation of different objects, from what are really perceived is called a Delirium. A symptom of the most violent disorder, and which never occurs, but where there is a very high degree of Stimulus active in the body. The causes of this may be, either too great a spissitude and density which obstructs the Motion of the vital Powers, and in consequence excites a violent degree of Action in them; or a predominant Acrimony which immediately affects and torments them. We are never disposed to discover, by our common power of Sensation, any increased Action of our vital Powers, but our organs of Perception are capable of doing this, and we employ them constantly for that purpose. Our Touch is the standard we make use of to ascertain this fact. It is not improbable, however, that in all our organs the same may be perceived, and if this ever takes place, it must appear in the resemblance of its proper object, as we have
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shewn in our thoughts upon Dreaming. We cannot feel with our Eyes any more than we can see with our Fingers, and from hence we may argue, that the Perception of a Pulse, in the organ of Sight, must put on a very different appearance from what it does to the Feel. If we had never seen, we should never have had any Perception in that organ, but we should have been capable only of the general affections of Sense. But after we have once enjoyed that faculty; Memory naturally suggests the idea of the proper object, whenever an impression is made, notwithstanding it proceeds from an external cause, and nothing *ab extra* corresponds to it.

THE same will happen likewise, if the impression from within is superior to that made by any external object, that should offer itself. This may be proved from the influence of one object over another; for it may always be observed that the superior
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impressions are attended to and regarded, whilst the inferior are neglected or obscured; and upon this the nature of Light and Shade is established. Now in cases of Delirium, a very strong impression is made upon the Retina, from disordered Matter circulating through its small vessels; but the objects from without are few in number, or inconsiderable in degree; hence it is that these are unattended to, whilst those which appear more vivid and considerable are observed. Distance, as we have remarked before, is established upon a principle more mental, than any bodily affection; upon this account therefore, persons in this state are very competent judges of this effect, and always imagine objects to be much nearer to them than they really are, as well as increased in their size and bulk. Delirium in the same manner as Dreaming has a reference to every organ of Perception, but it chiefly exercises itself upon the objects of Sight. For this reason therefore, we were willing to give it

a particular consideration in this place, especially as it will be very easy to deduce every other effect from it, agreeable to the rules we have already laid down for this end.

S E C T. V.

Of Hearing.

IT would be a difficulty perhaps to determine, whether the organ or instrument of Sensation, which we have last described, or that which we are now going to elucidate, was more useful to mankind, or conveyed to us the highest degree of intellectual pleasure. A preference certainly there is, which must be given, and from the extent of the organ of Sight, and the accuracy with which it brings information, is certainly due to that instrument. But still in the perceptions of the Ear, we shall find

find more of that truly mental and refined pleasure which can flow only from a peculiar cast and disposition of Mind; and are informed by it more of the nature of those distinctions that result from the exercise of mental powers. Beauty is an object of our seeing faculties, and is the most intellectual which that Sense perceives; but still it carries a conviction with it of something sensual, and convenient for many purposes of our material form: upon this account, we can hardly review the idea of its excellence, divested of its object or alienated from Matter. But Harmony, which is the object of this organ, is so pure, so free from any incumbrances of this nature, and so independent of any sensible object, that although always excited by it, yet the idea is centered in itself; and we admire the force of its power, whilst the hand that gave it birth, or the instrument upon which it is raised, is neglected and disregarded. Upon these accounts, we have delayed the consideration of this organ, until the last.

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We shall not, however, be able to enter into a very exact disquisition of it, and for this reason, that the objects that affect it are so simple and uniform, and so different from the peculiar forms of Matter.

THE instrument, by which Hearing is perceived in the Mind, is situated at a very little distance from those of the other Senses. But it is as different in its mechanism as the objects that affect it. The Ear is formed like a musical instrument, and if it could be imitated by art, might be found perhaps the most perfect pattern of such a body. It is not probable however, that it suggested such an idea to the first artists. Anatomy had then made but little progress, and the discoveries of this wonderful machine have been accomplished in very modern times. A composition of various cavities to return and reverberate sound, after it is once raised, and of strings to excite it at first, may give a sufficient idea of this organ, to account for the various revolutions

tions performed on it, without entering into a minute examination of its particular substance, &c. Upon this structure, we shall see that Motion is entirely requisite to produce the effect proposed. In Taste, in Smell, in Touch, and in Sight, the necessity of Motion was not so apparent at first sight. But in this sense we shall see, that without it no agitation can be raised, and in consequence no Perception produced. The immediate object that occasions the vibrations of the auditory Chords, is one simple uniform body, acting by a particular power with which it is endued. This substance is, that pure element the Air, and the power by which it acts is Elasticity, or a general Repulsion by which its parts recede from each other. This body equally extended over the earth, and surrounding every thing upon it, must be susceptible of continual changes as they are put into motion, and thus become in almost a perpetual state of action, and when carried forward to the organ of Hearing,

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ing, excite that affection. Notwithstanding, however, that the Air is the immediate cause of this effect; yet it must be considered only as the instrument, and there are several other circumstances that must be taken into the account, in order to create Sounds.

1. IN the first place, there are peculiar bodies that excite them much sooner than others; and these must be determined by a particular form of combination, or rather method of conjunction by which their parts adhere to each other. There seems to be something very extraordinary in this fact, and it is difficult to account, why some bodies should become more sonorous than others, and why some should be entirely silent. The best explanation that can be given, is from a capacity of repeating vibrations after once they are excited in some, while others are dull, sluggish, and inactive. But what is necessary to enter into the composition of these bodies

to occasion this power, we cannot speak with any degree of certainty. For notwithstanding we find this quality peculiarly excellent in one species of bodies, viz. Metals, yet what the ultimate composition of these are, we have never presumed to determine.

2. IN the second place, another circumstance which we may observe necessary to excite Sound, is the confinement of Air to a narrow and circumscribed space. This is the origin of those natural Sounds which are the most beneficial to mankind, and from which language derives its origin. How this is accomplished would belong to another place to consider. Hearing is to be esteemed as a passive power only, when considered in an intellectual view, it is active as it conveys ideas to the Mind, after once Sounds are excited. We have already hinted at the wonderful mechanism by which Action is excited in this organ, and we have only now to add, that it may
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be taken as a specimen for the rest of the Senses to demonstrate the power of Motion in their several organs. In this we see the Motion of the Air is first raised to give the impression, the impression itself is induced as upon a musical instrument, and the Re-action of the auditory Fibres, by which the notion is conveyed to the Mind, is a further confirmation of the fact. From hence we may conclude then, that there is nothing truly passive in the whole of this operation, but that a constant exercise of a moving faculty is necessary for this end.

WE have already hinted likewise, at the great source of intellectual Pleasure and Pain, which this sense affords by the influence of Harmony and Discord. Besides this, it is capable of an effect of this kind from language, the most divine of all human inventions, of the greatest utility to mankind, as well as the most unaccountable in its origin. Upon both these different perceptions, derivable from this organ, it

might

might be necessary to descant; and a sufficient field is open for a disquisition of this nature, we might enquire into the origin of natural Sounds, and might account for the various effects of music. But this would not only be enlarging our plan too far, but would lead us into a consideration of powers too intellectual for our present purpose, and from which no corporeal action can be adduced. We cannot speak positively of the sensible Pleasure or Pain that results from this organ; in general these affections are purely intellectual, but like the Eye it may become disordered in such a manner, as that every Sound shall be disagreeable and uneasy to us. And as in that organ Delirium was induced from an action similar to the original impression, so in this we may deduce the same effect from that cause, and by this means account for the Tinnitus Aurium, a symptom of the utmost consequence in Fevers.

C H A P. VI.

Of IMAGINATION, and its Power
in creating M O T I O N S in the
Corporeal System.

S E C T. II.

*Of a spontaneous Power in the Mind to in-
fluence a corporeal Effect independent of the
Will.*

EVERY one must allow, that there
is a very strong connexion between
the Body and Mind of Animals, and that
all our spontaneous actions, and many even
of those which occur without our consent or
knowledge, are not directed by mechanical
rules, but depend upon a much more noble

principle. It is perhaps capable of demonstration that all our actions, either spontaneous or otherwise, arise from the same source, either as a primary or a secondary cause.

THE immediate influence of the Mind, is most evident in the Actions of the Will, where every one is sufficiently conscious of it in his own breast. But yet there are other Actions produced, entirely independent of the Will, and yet rely upon a mental cause. We do not, however, immediately perceive the Action, and are only made acquainted with its effects; upon this account, therefore, we do not so easily admit of this conclusion, but seek for the interposition of some other cause. The modest Blushes of innocence, the Tears of a person afflicted with distress, or the involuntary Laughter of one that is pleased, are certainly Affections of the Mind, and yet independent of any voluntary power. The manner indeed how these effects are

produced, hath not been sufficiently enquired into. If it had, many other affections of our constitution, and many disorders likewise, might have been found to arise from the same source, which have hitherto been vaguely accounted for, or left in suspense. Because it is difficult, is no reason, why we should relinquish a search after truth. For from what has already been discovered in Physics and in Medicine, we may imagine, that every thing almost is capable of being brought to light by the inventions of mankind. We are sensible of many objections that may be alledged against this power of Action in the Mind, and especially if we attempt to deduce the cause of any disorders from it.

1. In the first place, it may be said that some other cause must interfere for this purpose, of which we are ignorant. But no other cause can be suggested in this place, but of the following kind, either some pre-disposition of the Body, which
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acts as a Stimulus, or the influence of some material Substance, which constitutes such a Body. That these have indeed a very powerful influence, in exciting the action of the animal Fibre, I am so far from denying, that I have before endeavoured to prove it in its utmost extent ; but I think it is equally evident, that they do not always act whenever the Mind seems to cause a Motion in the system. Every one will grant, I believe, that there is no necessity for a peculiar disposition of the Body, or the action of any particular Stimulus, to excite Tears in a person in grief ; no more do any other actions, that seem to arise from the Mind, always require a Stimulus to induce them ; but the Mind may perhaps be as powerful when these things are absent. A Stimulus applied to the Eyes will cause the Tears to flow, and a Stimulus applied to any other part of the Body will cause an Irritation in it. But in general, the Mind causes that Irritation in the Eyes without this assistance ; why may it

not act equally as powerful in any other part of the Body?

2. ANOTHER objection that may be alleged against this doctrine, we shall suppose to be this, that the causes of these Actions, which we deduce from a mental influence, may be unknown to us, or be beyond our search, and hence may be determined to belong to any Actions or any Disorders, to which we shall chuse to affix them. Many of these no doubt are of such a nature, that we can refer them to no immediate cause at all, having no lights by which we can trace their origin, no apparent causes present at their existence, and no concomitant symptoms, which acknowledge causes that are settled and determined. The cause, however, of which we are treating, can never be said to be a subterfuge for these that are unknown. For notwithstanding it may be said, that the Mind is a Substance, that we cannot examine into, and may produce many effects
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which we are not able to demonstrate as such, yet when we have this evidence, that the Mind can produce such Actions, as I hope will hereafter be demonstrated, and that it is always apparently present as a cause when they are produced; we need be under no anxiety, when it is said that other Actions and Disorders may derive their origin from this source, when this cause cannot be imagined to be present. A continual presence, I allow, is not an undeniable argument, in favour of a cause whenever effects are produced. Effects from the same cause, which appear at the same time, may oftentimes be taken for cause and effect, as for instance, the production of Light and Heat, which notwithstanding they sometimes appear as Cause and Effect, at other times seem to acknowledge the same origin. But I believe the same cannot be imagined in the present case: for in that the influence of the Rays proceeding from the Sun in a greater or less density, or some operation in nature may
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be the cause of each of those consequences, but what one substance, or what operation can be the author of those which we are mentioning here. A person is injured by another, he is fired with resentment, but the other eludes his pursuit. This preys upon his Spirits, and in consequence introduces Disorder into his constitution. What one Cause can produce both these Effects immediately ; the injury he receives from which the whole originally proceeds, can never occasion the Disorder, but as it first affects his Mind, which then acts by its own immediate influence. By this then we may see, that such can only be produced by a mental power, which in this case acts as a Cause, and is not a synchronous Effect.

3. A FURTHER objection that may be adduced against us, is entirely a medical one, and relates to the Effect of the Mind in creating Disorders. It is this, that by admitting this power, we may confound the

the distinctions of nervous diseases, a class of such infinite consequence in the theory of Medicine. It will be a very great difficulty indeed to answer this question, the term Nervous being so vague and uncertain, and the Causes from which these Diseases proceed so various: for they may derive their origin accidentally perhaps, either from the Causes we are now speaking of, from a Stimulus that irritates the nervous Fibrillæ, or from some unknown cause, for which we can assign no reason of its Action. It would be an advantage perhaps to physical knowledge, if this term were expelled from it: for every disorder almost, agreeably to modern theories, may be deemed of this nature, all having some connection, or being absolutely dependent on the nervous System. If the defect lies in the obscurity of the term then, we need be under no concern about it. But waving this, if we confine nervous Disorders to those where we evidently see the Mind affected, as well as the Body, and where there

there is evidently a depression of the Spirits; let us see what confusion, the Disorders we are desirous of ascertaining, can introduce amongst them. It is evident these, as well as the others, depend upon a mental influence, but the greatest part of nervous Disorders depend upon it as a secondary, not as a primary cause.

LET us suppose that the Mind, as endued with Action, is continually endeavouring to exert itself, and to perform some Motion; and the Body, let us imagine to be its instrument for this purpose: Whilst the Body then is in a perfect state, the Mind may act upon it as it chuses, and direct it to whatever Motions it thinks proper and convenient: It may direct it sometimes to those that are prejudicial and destructive, as well as to those that are salutary and useful. When it produces the former, there is no doubt but it will cause a Disorder, and then we may pronounce it the primary and self-sufficient cause of the

Disease.

Disease. But we may suppose likewise, the Body to be indisposed, to be sluggish and inert, and incapable of being acted upon by the Mind: in consequence of this, it finds a resistance in the Body to its Action, and hence becomes uneasy, and disturbed in its Motions, Upon this, there occurs a Disorder both in the Mind and the Body, as in the former case; but the Mind is not the primary cause of it: But as in the other case, it was acknowledged to be such, with regard to the Body, so here the Body becomes the primary cause of the Disorder with respect to the Mind. In that, the Mind being previously disordered, affected the Body with it, but in this the Body being indisposed, brought upon the Mind a similar effect. From this then, we may see that a very important distinction arises between nervous Disorders, and that those, which are to be deduced from the subject of this chapter, constitute only one part, which may easily be distinguished from the other.

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HAVING removed some of the objections that may be alledged against a power of the Mind in general, of acting upon the Body, and producing Disorders in it, we ought now to proceed to examine that particular faculty which is endued with this power, and explain the manner by which these effects are produced. We have already observed, that there is a particular power of the Mind, which no one doubts of effecting various Actions; where we can trace the immediate connection, and where we can perceive the influence of the Cause to be instantaneous with the Effect. This is called the power of the Will, in whose Actions the presence of the Mind can never be doubted or disputed. It will be necessary, however, before we enter more particularly into this subject, to examine into the extent of this power of the Will, as well as the manner in which it produces its Actions, in order to discover whether the Actions, for which we are
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now contending, may not proceed from its influence.

BOTH these things have been much controverted amongst Physiologists: It is very surprizing how mankind could ever enter into a dispute concerning its limits: Every man knows when he wills an Action to be done, and is equally conscious of it when it is produced. Whoever attempts to extend this Power beyond this, certainly extends it beyond all bounds, and reduces it to nothing: For he makes a man to will an Action, and not to will it at the same time, which is impossible. If we take away Consciousness from Willing, we entirely take away the power of Willing at all; but if we leave Consciousness, there can be no doubt concerning the extent of its Action. The reasons of the error and obscurity, by which Men have been deceived upon this account, may probably arise from a pre-conceived opinion, that the Will involved every other power of the Mind, or at least,

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from being accustomed to consider no other mental faculty but this. We are absolutely certain, indeed, of no other power, which can be so easily demonstrated; but yet we have very good grounds to conjecture, that there are other powers, notwithstanding we may be ignorant of their proper and peculiar nature.

THE manner in which the Will acts upon the Body, is more uncertain and difficult. All that we know is, that upon every Volition, a particular Action, visible to the Eye, although of a peculiar kind is excited. But such Actions are not confined to a voluntary influence, for they may be produced without it, as is evident whenever we are affected by violent Stimuli, in epileptic fits, or other disorders that arise from something very acrimonious and pungent. Does this admit of a conjecture, that the Will acts like a Stimulus! We must leave it in doubt, in order to take notice, that the Will acts only upon a particular

tidular part of our Constitution, of a peculiar form and construction. This is the *muscular* Part to which its Action is confined, but over all of this kind it has not an indiscriminate power. The Heart may be considered as a Muscle. The Arteries and many Viscera have muscular Coats, and there are several regularly formed Muscles of the Body, over which the Will has either never acquired a power, or has lost it for want of frequent use. We see then that the Actions of the Will extend no farther than where we are conscious of them, and that they are confined to Muscles.

—We have not as yet particularized the Actions which are the subjects of this Chapter, any otherwise than as dependent upon the Mind. We may, therefore, in forming the distinction between these and the Actions of the Will, proceed upon the general plan, and enquire whether it is not possible that other Actions may be pro-

duced by the Mind independent of that power. If Consciousness of Willing may be presumed to be the criterion of its influence, this question may easily be decided. There are so many Actions performed in our system, not only without Consciousness, but which we are conscious are disagreeable to us, and which we endeavour to prevent by our voluntary powers. But here an objection may be raised, that our Wills even are necessitated in their Action, by the apprehensions of moral good and evil. To determine this question, it would be necessary to discuss the metaphysical debate of *Liberty* and *Necessity*. This we shall avoid at present, and only ask this question, which I think may clear up this point. Whether in the Paroxysms of an *intermittent Fever*, our Wills concur with the agitation of Body, that is occasioned in it, or whether we are not conscious of willing, of desiring, and of endeavouring, by every thing that lies in the power of the Will to remove it.

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WE have seen that though the voluntary power is confined to Muscles, yet that these may be moved without its concurrence, in many of the principal Actions of the Body. But suppose a Muscle could not be moved without it; are there no Actions in the Body but what are performed by these parts? A Muscle may be considered as a fleshy substance of a red colour, and composed of fibres that in action are always contracted in their lengths. But how many parts of the body are there, that have no such structure, and whose Action does not in the least resemble this, but is performed in a very different manner? Of this, we have a very lively instance in the *Cuticle*, and indeed in all the Membranes that invest so many parts of the body. The actions, however, of these parts and most of the rest, which we have adduced as examples in this Section, are indeed excited by a Stimulus; but we shall hereafter

shew that the Mind has likewise a very considerable influence over most of them.

I NEED not mention here how absurd it would be to suppose, that the Will would ever chuse to produce a Disorder in the body, if it lay ever so much in its power. And this may be imagined, not from a fondness of life and ease alone, but from this circumstance also, that it would have an unlimitted power over all the necessary functions, which it might put a stop to at once, and finish life without the tedious process and bitter languishings of Disease. But we find from experience, that the Functions are not under the power of the Will, and that whenever mankind enter upon a resolution of destroying themselves, by the means nature has put into their hands, they never think of tormenting themselves by any previous Disorder.

S E C T. II.

Of the Power of Imagination considered more particularly; the Causes of its Action, and its Effects on the Body.

WE are now to enquire in a more particular manner into another faculty of the Mind, than that which so easily suggests itself: And the first thing that we are to consider upon this occasion is, whether it is the whole power of the Mind, besides that of the Will; or whether it is like that, *fui generis*, and confined to peculiar motions. The Mind no doubt may be possessed of various uncertain powers, by which it acts upon the corporeal system. We are sensible of a few only, that of the Will is most evident. This perhaps may admit of a demonstration equally as faithful, and if we can deduce every effect from it, we need not

be anxious about any other of which we may be ignorant.

THIS power is what we shall call that of the *Imagination*, a term indeed in itself vague, uncertain, and groundless; but which yet has had a peculiar signification appropriated to it by the generality of mankind. The most strict, original, and confined idea of it is to be derived from mere Perception, or the representation of Images in the Mind. It was easy to transfer it from this to a similar representation of objects when they were absent, and thus was made to correspond to the power of Reflection. But as some kind of Images are necessary to the exertion of every mental faculty, the Ideas, that derive their origin more immediately perhaps from ourselves, are primarily formed in our own Minds, and have no exact patterns in nature, were still called Images, and the faculty of exciting them stiled *Imagination*. By this means, we see it is become similar to *Invention* also. It is sur-
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prizing how much it should be appropriated to the last of these faculties. The effects of it are peculiarly called the fruits of Imagination ; and what do we understand by Fancy, but a high exercise of this power. Thus in its most dignified sense, a man of fine genius is said to have a fruitful Imagination, and even in its lowest acceptation, the whimsical and fantastical Humorist, who invents trifling objects of enjoyment, is said to be Imaginary ; and the Disease, in which Symptoms are invented, that were never felt, has been always stiled the Disorder of this power.

As we are to speak of Imagination, not merely as a power of the Mind, but as extending to the Body, and as a power that acts upon it ; we must include every signification that we have allotted to it, as it depends sometimes on one source or sometimes on another. In all these it produces effects, which although they do not admit of an exact resemblance, yet in

themselves have a very near affinity. With respect to this power, as a quality of the Mind, it must be looked upon as active in one respect only ; but here we are to take quite a different view of it, and consider it as active upon the Body in every respect. Imagination then, we may observe, in this sense is extended from its former signification, to an effect that is produced from its former principles, and thus signifies a capacity of exciting Actions upon the corporeal frame, arising originally from the different powers of Sensation, Reflection, and Invention. But still, whenever thus qualified, it is not sufficiently active of itself, but disposed only to this end, and requires some particular motive or cause to promote that ability. Let us next consider then what it is that gives it this power.

IN the first beginnings of life, Ideas enter into our Minds, are there treasured up with care, and are occasionally brought

brought out to use, by Recollection and Memory; but never give us any uneasiness when we are without the objects of them, or pleasure when they are present. We are satisfied almost at that time with instinct, which directs us to our food, and we are otherwise taken care of by our Parents. But when Parents begin to lose their Affection for us, and instinct leaves us to ourselves; what have we trust to for our support and preservation? Nature has at this time laid in sufficient store to supply our future wants, by means of those Ideas that are treasured up in our Minds. We begin to perceive that many of the objects of them are necessary and convenient for our future subsistence; upon this, there arises a particular desire for their enjoyment, and this is the Origin of Passion. As a proof of this, we may observe, that through all the occurrences of life, every object affects us with this circumstance, when it becomes convenient for us; then, and not till then, we begin to desire and wish for it; and

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from hence it is, that we see different Passions annexed and suited to the different ages, as well as stations and conditions of mankind. There are but few ideas that can possibly arise from any object, to which we are absolutely indifferent, some good or evil must be seen or apprehended in most of them; hence the desire for them, or aversion to them, is continually agitating of us, and our whole existence is a life of *passion*. Passion in consequence of this, always directs to Actions, or is the motive by which these are performed. It may be asked, however, whether such an affection of the Mind always causes an Action of the Body? It seems most probable that it does; but to examine this more exactly, we should always have in view the distinction we have before insisted upon, between the Actions of the Will, and what we are now examining; for that requires something more than Passion to excite it. It is something that superintends our Passions, over-rules our Desires, and directs to what

is right, that governs the Will, and that is *Reason*. In this case, the Will acts under the conduct of this Power, in destroying or promoting the Action of Passion as it sees fit. It does not act, however, in placing before us or in removing the object, but by suppressing or encouraging the Action after once it is excited. The Action of Passion arises immediately from the object, and precedes that of the Will. If there was no object of Desire, this affection would never act; and if that did not act, the Will would lie dormant. The true state of the case between these two Actions, may be thus further illustrated. Whenever objects offer themselves with which the Ideas of *good* and *evil* are connected, they are received into the Mind, they create Desire, and very often a visible Action of the Body; if Reason approves of this Passion, it encourages the Action to accomplish its end, and adds an effort of its own, by which it completes an enjoyment. But if it disapproves of it, it
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endeavours to suspend it, and interposes its own influence to stop and prevent the gratification. Hence it is, we see, that the Action of the Will is necessary for Fruition, but not for mere Motion, and that Action evidently may arise from *passion*, though not perceptible to our Senses.

FROM the whole then, that we have examined, we may form this conclusion, That with regard to the power of *Imagination*, the three faculties of Sensation, Reflection and Invention, are the Principles upon which it proceeds, and that *Passion* is the motive to action arising from them.

IT is true indeed, that we do not always see or perceive an Action of the Body, whenever the Mind is affected with Passion; but we have just reason to suppose it almost always the case, from its visible effects when violent or of long duration, from the changes induced by it in the system, and what is to our present purposes
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from the great influence of it in many functions and diseases of the human Body. We may reason too upon the justness and propriety of such Actions *a priori*. The Actions of Passion may be considered as the same guides to the Actions of the Will, as the Passions themselves are guides in a moral view to the exertions of the Will.

WE shall now endeavour to evolve these Actions more particularly, and observe the different effects, which the various kinds of Passion produce in the Body. And previous to the great and important changes induced by them, let us take a view of the more simple Actions visible to us, that proceed from their influence.

SIMPLE Ideas can have but very little effect in this way, because it is the affections or particular circumstances of Bodies that strike us rather than the objects themselves to which they belong. The first
Action,

Action, as well as the most simple, that arises, must be from a single object with which the notion of *good* or *evil* is in some degree connected. Thus the view of any object, that has contributed at any time to our ease and pleasure, creates in us, besides the gratification of an intellectual Feeling, an agreeable corporeal Sensation, proceeding from an irritation of the Body. This is the most evident upon the view of grateful Food, which not only produces these effects, but raises a Perception similar to what we felt before, and throws out a copious flow of the salivary juice. But Sensation is much stronger when objects of Displeasure are presented to us. To a person, who has suffered an amputation, or is of a timorous disposition, the sight of a Surgeon's instrument, or of a sword, has been attended with the greatest uneasiness, has induced often nausea and vomiting, and occasioned the relaxation of some muscles. The same effects are often produced from nauseous medicines. I have known
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a looseness of the belly proceed from the thought as well as appearance of a cathartic, and a vomiting more particularly from the bare mention of an emetic. May not the various Likings and Antipathies, to which almost every one is in some measure subject, and which are scarce to be accounted for upon any other foundation, depend upon this principle? Every kind of Stimulus, that can affect the Body, may no doubt upon recollection, produce an effect similar to what we have mentioned. In fact, we see they do. We have hardly any notion of external Stimuli, but from pungent instruments, or from medicines, because they never constitute a part of what is necessary for our existence, but always tend to destroy. But if by any means, we experience medicines of this kind, or by accident meet with any thing very acrimonious; whenever we reflect upon it, we always feel a disagreeable Sensation in the part affected, similar to what occurred when its influence really existed. There

is no Sensation scarcely so disagreeable, as what we feel upon the application of strong acids to the Teeth, and the Idea is equally affecting to those who have ever experienced it, in any degree, or are possessed of a very sensible constitution.

BUT it is the effect of internal Stimuli, that we are sensible of the most frequently, viz. in all the disorders that are attended with Pain in the human Body. The Reflection upon any of these always affects us with an uneasy Sensation, and a kind of return of the same disease. Whoever has by an unhappy experience, been tortured by any violent complaint of the bowels, a *calculus* in the bladder, tooth-ach, or an amputation in any of his limbs, will confess the truth of this observation. We must acknowledge indeed, that it would be very absurd to think that any disease should return with any violence from so slender a cause, where a more particular one does not prevail. But this is evident, that if
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by abstracting the thought, a violent pain should seem to be removed, upon recollection it returns with as much force, if not more considerable than before. The influence of Imagination in this respect, is exceeding violent in some people. I know a person of the profession of Medicine, who, whenever he reads a medical description of any painful disorder, is always affected with a Sensation of the same Nature.

NEXT to the ideas of single Objects themselves, and at rest as connected with Desire, we are to consider the effects they produce, when brought into Action. The Motions of Bodies seem to affect us more violently and more extensively than any other circumstance that belongs to them. And this may be accounted for in a very rational manner. When we reflect upon a single Object at rest, the idea seems confined to it in that situation from which it never varies, and conveys only one idea,

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but when the Object is brought into Action, it appears moving and fluctuating from one point to another, and raises the idea of distinct place, which is almost the same as of different Bodies. The Ideas are increased, although the Body continues to be the same. Besides this, the Pleasure or Pain likewise we receive from any Ideas are raised much sooner by Bodies in motion than by those at rest, and for the same reason, because the quick or slow transition of Bodies occasions these affections, whilst we are indifferent to those at rest. Let us examine this by an example: If we look steadfastly upon a Wheel in a very rapid motion, it affects us with a painful Feeling, because we cannot receive a distinct Idea of every point of it, but the wheel itself would not perhaps affect us at all. The rapidity of a River, on the contrary, may contribute to give us Pleasure, because there is no eye, but can easily discover a sufficient number of distinct points. The river itself however would hardly affect us. In these

these cases we may observe then, that the Motion of these Bodies is the sole cause of the Emotion, but that the *pleasure* or *pain* that arises, depends on the degree of it. But to apply this to the power of Imagination. We have presumed that these Actions correspond to every mental Affection, and from hence the same reasoning will hold good with respect to them. But we may almost prove it by experiment, that the quick Motion of the wheel, which was mentioned above, very frequently creates a Giddiness, and this not only when present, but afterwards when reflected upon by a lively Imagination. To what other source but this, shall we refer the disagreeable Sensations that arise in Music or jarring Sounds, upon some very sensible Constitutions? Are they not evidently dependent on irregular Motions to which we are unaccustomed, and in which we cannot easily perceive the relation they have to each other? But on the contrary, the smoothness of Harmony reconciles their irregu-

larity, and in consequence excites Pleasure. It is not only more agreeable or offensive *Sensation* of the Body that arises from *Music*; many very apparent effects on the system, have been adduced from its influence, and a disorder, to which it is sometimes subject has been said to derive its rise from this source.

IN the Actions which we have already mentioned, as proceeding from Imagination, good or evil, is hardly perceptible in the causes of them. When we reflect upon Actions, with which these circumstances are connected, a little more particularly, we shall be affected much more violently, and this will happen either from those that are real, or those that are imaginary only. There is nothing affects our Minds more forcibly than the description of a famous Rencounter. The advantages of one party, and the disadvantages of the other, alternately swell or depress our enjoyments. The Body partakes of an Affection correspondent

spondent to these circumstances. Thus the death of any favourite Hero, especially if attended with any horrible circumstances, raises a strong and violent shuddering, whilst on the contrary, the success of another, in whose history we are particularly interested, gives us that light and easy emotion which is peculiarly appropriated to joyful events. We are however much more forcibly affected, when these things approach nearer to ourselves. If any Action has contributed to excite any of our Passions, we reflect upon it with a similar emotion. The delivery from any fatal accident, has frequently been attended with the worst of circumstances, and these often arise from reflecting upon the danger we sustained at such an extremity. The appearance of violent Passions in another person, is what we are very much affected with, and this may not arise from any fear of detriment, because we may be in a situation of absolute security; but from a reflection of the disagreeable nature of such an Action in

ourselves. To this head, may be referred likewise, the disagreeable Sensations that horrible persons, who are deformed in some part of their Body, but especially in their Face, excite in us. Tranquillity and ease inspire the Countenance with a smooth and calm appearance, whilst tumultuous Passions occasion the contrary. From hence it happens, that a deformed Countenance is esteemed the mark of Anger and Ill-nature. This deformity may likewise proceed from long continued Pain, which any one suffers; but whether it has this effect or not, Pain in another person is a source of very powerful Sensations in us, resembling in some measure what the afflicted person has endured. Every one is acquainted with these facts; that nothing is more frequent than for vomiting to excite the same action in some of the spectators, and that the observation of an amputation has given a Sensation in a part correspondent to what is affected, in spectators who have not often been present at such an operation.

THESE Actions, arising very evidently from our Ideas, and connected always in some measure with Desire; might have been included amongst those which we shall deduce from particular Passions: But as they do not seem entirely capable of being adjusted with any particular kind, as they seem to be produced by a more simple Affection, and as they may serve more properly for an introduction to them, we have treated of them separately: But still it must be remembered, that they are always connected with so much good or evil, as to excite Desire or Aversion. And this appears in a very different manner from the causes whence they derive their origin, and the methods by which they affect us.

S E C T. III.

*Of the Actions excited by the different
Passions.*

WE are now to explain the effects that are produced by what are more properly called the *Passions* of the Mind, or the different modes by which Desires exert themselves in us, and aim at Gratification. These possess very evidently a power of desire in our breasts, that is not subject to any peculiar mode, or has this determined by the object alone. This is what may be called a simple Desire, or general Passion. What are more strictly denominated Passions, although excited towards the same object, operate very differently on the Mind. No one will dispute the different manner with which *Fear* and *Anger* act upon us, although raised by the same person, and upon the
same

same motive. But this general Affection always excites in the Mind the same emotion towards the same person, and differs as the object varies. There are but few visible effects which we can take notice of, that arise immediately from a Passion of this kind. But yet some of the most powerful have been attributed to it, and it has been accounted the secret cause of some very urgent diseases. Every man, who attends to his own Feelings, will find in himself, an uneasiness that always corresponds with this Desire at the time of its Action, and affects him with a strange perturbation for which he cannot account. Avarice seems more particularly to be an appetite of this kind. It can be referred to none of the more natural Passions, that are implanted in us for peculiar uses in life, but arises from an undue estimation of a particular object. The effects of it upon the Body are very apparent, and perhaps offer as illustrious an example of the great influence of these Affections as any that

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can be produced. A general waste and decay of flesh, depression of spirit in the highest degree, loss of appetite, and defect of sleep, a certain meagre and worn-out countenance, and continual disorder are its genuine consequences. But it so happens, that the most satisfactory advantages of health and long life, are enjoyed in the greatest perfection by those who are least anxious for sublunary enjoyments.

WE shall now examine the more particular Passions, to which Names have been affixed; and in this consideration we shall not attempt at once to explain their immediate Actions, or the consequences that are deducible from them. We shall be content, with demonstrating the most visible and apparent effects we see produced by them in the system. And as in the former instances of the Power of the Imagination, we shall principally attend to the Sensations that we are conscious of from this source.

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WE shall begin with those that are the least tumultuous, or occasion the least violence in their effects; and not as they are involved in Desire. And this, because we are not to give a mere description of the Passions themselves, but of the effects they induce upon the animal Constitution.

THE first then that offers itself, is that affection that reigns reciprocally between the Sexes or LOVE. Nothing can be more evident than the powerful influence this Passion has over both the Mind and the Body. It excites a general Irritation, and often a Sensation likewise over the whole system; but more particularly in the part of Gratification. From this circumstance, many have been willing to deduce this Passion from a latent Stimulus, or a previous corporeal Affection. The Desire is often so apparently connected with something of this kind; that it is no wonder they should consider it in this light, especially when
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it appears to be a Passion instituted to discharge itself of a Secretion, the final cause of which is so necessary for the preservation of Animals. It is not to our purpose, carefully to discuss this question. It will be sufficient for us to shew; that at a time when our Desires are calm and easy, and we find the influence of no Stimulus, or are affected with no Sensations of this nature; the idea of an amiable Object shall immediately excite this Desire, affect us with strong Sensations, and cause very powerful Emotions. It may be observed further, that these effects arise from the grossest idea we can affix to this Passion, and which has a view to Gratification only. But when it becomes a generous Affection, from which higher advantages are expected, the whole system will be brought into agitation, and a general shivering in every part, tremblings of the limbs, palpitations of the heart, an irregular pulse, paleness of the countenance, and in the more delicate Sex often faintings and languor, will be the
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product of this Passion. Are not these surprizing consequences indebted to an affection of the most noble principle of our nature? If not, to what corporeal or mechanical influence shall we ascribe them.

IT may be worth our attention in this place to consider, that *Friendship* even, grounded upon Passion so far, as that we desire the company and conversation of those whom we esteem, as well as the more noble affections of *compassion* and *benevolence*, may produce similar effects in our corporeal frame, may excite it to action, and be the author of very considerable Sensations. We are sensible of a peculiar feeling, upon the approach of an absent friend, and every one of the least sensibility knows how an object of compassion affects us. The same event, though attended with a different Sensation, is observable from the opposite passions of Hatred and Aversion. These, whenever they arise, not only excite others to the injury of the object of them, but

in themselves produce very forcible Sensations, upon the reflection or sight of those against whom they are levelled.

FROM this we proceed to consider the peculiar Actions produced by *Envy* and *Jealousy*, whose visible effects are no less conspicuous. These Passions seem to be the same with regard to the effects they produce, both upon the Mind and the Body. They seem to differ only in the objects towards which they are excited. Envy has for its object the person that enjoys any peculiar good, whilst Jealousy is raised more particularly against the good itself which is enjoyed. But Jealousy is not always to be observed where there is Envy, though the latter always accompanies the former affection. Jealousy is generally confined to persons, and may be said to be a *species* of Envy. Their visible effects however upon the Body are the same as we have before-mentioned, frequent tremblings, and palpitations of the heart, especially upon the
sight

sight of the object, prostration and loss of appetite, as well as sleep, an involuntary conformation of the muscles of the countenance, which establish an habitual deformity, the production of very violent disorders, extreme and terrifying convulsions, and often the fatal consequence of death itself.

THE next Passion we shall take notice of, is *Hope* and *Fear*. With respect to the Mind the same Passion, and differs as the last in the objects upon which they are exerted. The difference however is established upon an opposite principle. They were both passions of Aversion, but these differ as one affects the Goods of life, the other the Evils of it. Their effects upon the Body, at first view may not seem to resemble each other so much as might be expected; but when we come to enquire into their immediate effects, they may be found to be much the same, and differ only in the degree of violence in the Action.

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The final cause of this is very evident, there are so many more important things to fear than to hope for. Hope directing us always to good, occasions in us a pleasing Sensation; and although in itself it is an uneasiness which would fail to give us pleasure, if it arose from any other source, yet as it is directed by this Passion, the pain is over-looked and disregarded, and it is esteemed a pleasure. So uncertain are the foundations upon which we build that happiness that results from our bodily feelings. There is commonly a kind of nausea, with which we are affected from this Passion, and it is often attended with considerable shiverings and tremors. But the effects of Fear are much more evident: This Passion is excited in a degree always equal to the importance of the object, which is no less than life itself, the blessing from which arises every enjoyment, and every enjoyment that arises from it. A faltering tongue, a trembling lip, a distorted countenance, an erection of the hair, convul-

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five limbs, a throbbing breast, an universal agitation, and relaxation of many muscles, an undue tension of others, and in general, an inability to think, to move, and act like a sensible creature, are its common effects. It often puts on more particularly the form of the paroxysm of an intermittent fever, from a violent constriction upon the surface of the skin. By which it sometimes terminates in this disorder, or produces death itself. And thus the *coward* meets with that fate which it was his whole concern through life to prevent.

WE proceed immediately from this Passion to that of *Shame*, which is a Fear grounded upon something wrong, which we perceive in ourselves, and which we are afraid of disclosing to mankind. This could not be passed over without a particular attention, as it is a passion the most noble perhaps of human nature, and which has an evident and particular effect upon the human body. I mean in the affection of

Blushing, which may be excited in all who have not entirely lost every degree of delicacy, and sensibility of wrong and improper actions. We cannot avoid observing, that notwithstanding this effect is attended with a very disagreeable feeling; yet we reflect upon it with the greatest pleasure, because it can be excited only in honourable minds, and the defect of it is the highest disgrace to our nature.

THERE is no passion so violent in its effects, or so fatal to human nature as *Anger*; and as in the moral world it may have been the ground-work of the destruction that has been made in it; so in the natural constitution, it has often proved a powerful instrument in the quicker and more speedy solution of animal life. Is not this universal prevalence of it owing to the confidence we have in our own judgments, which can bear nothing contradictory or repugnant to them. Its effects upon the body are the most visible of any other passion, because it not only occasions a violent action
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in the involuntary parts, but counter-acts in some measure the power of the Will, and obliges her to act quite contrary to her own intentions and desires. Hoffman has given us this description of its effects, which is too elegant to be omitted or replaced; we shall therefore give it in his own words:—

“ Flagrant, emicant que oculi, multus ore in toto rubor est, labia quatuntur, dentes comprimuntur, surgunt capilli, stridet spiritus, gemitus, mugitusque ut parum explanatis vocibus, sermo præruptus et complosæ sæpius manus et pedibus pulsata humus, fœda visu et horrenda facies depravantium atque intumescantium.” Which may be thus rendered into *English*, “ The eyes shine and are all on flame, a settled fiery redness invades the whole mouth, the lips shake and quiver, the teeth are clasped together, the hair stands erect, respiration is sonorous, the voice hoarse and unnatural utters inarticulate words, the speech is interrupted, the hands clinched, and very often the feet beat and strike the ground

with violence, the countenance horrible and squalid, swells and becomes deformed." Besides this, the heart palpitates, the pulse quickens, and a temporary fever is produced. To this there often succeeds bilious vomitings, which are acknowledged as the diagnostics of this passion, by the bitterness in the mouth, and the violent pain about the *scrobiculum cordis*.

To conclude this account of the Passions, we must take notice of the effects of *Joy* and *Sorrow*. These affections, although they excite the same actions as the more general passions, yet cannot strictly be esteemed as such. Joy seems to be rather a completion of desires, than as involving any particular sort; but sorrow will not admit of the same exception, for it is founded entirely on Aversion, which can never be said to cease whilst this Affection continues. The effects of both upon the body are very considerable: Joy will take away all preceding pain, and sometimes re-
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store a diseased body to health. It will often likewise, when violent, in a healthy body induce disease, and sometimes be productive of death itself. By that riot it occasions in our system by various visible effects, by an agitation similar to what is occasioned by Love, and by an involuntary convulsion of many parts; it becomes too violent for one of a tender nature. Hence it is dangerous for some persons to hear good news, when they are not previously warned of it. The forcible effects of Sorrow are more common and more observable, because they arise from disagreeable causes; and hence it happens, that the flow of Tears, so frequently owing to this affection, is the soonest corporeal action almost, that is ever produced in us. But the Tragedy does not always end here. They are succeeded by nauseas, convulsive tremblings, and palpitations of the heart, which rack and torment the constitution, and introduce the worst of consequences. Two effects may be remarked as peculiar

to these passions; one is a slowness of the pulse, the other a great flow of saliva*. Many authors of the greatest credit have observed these effects; hence it was incumbent on us to take notice of them as the consequences of Anxiety. Notwithstanding however they are unaccountable in some measure, and not reconcileable to any distinct theory.

IN this view of the passions, we have not attempted to give accurate descriptions of all the effects that are produced by them in our system. It will appear hereafter, that by this examination we want only to settle a point of Theory in which it was necessary to distinguish the leading facts, and those that most resemble each other. This we hope we have done, and are ready therefore to proceed to a further elucidation of the subject.

* To this may be added a costive Habit.

S E C T. IV.

Of the Method by which Imagination and the Passions excite Actions in the Body.

WE have already laid before our view, many effects proceeding from Imagination as the cause of action in the corporeal system; it is necessary therefore, that we should now enquire, if possible, into the manner by which they are produced. And this must be done by tracing them up to their original source, and the primary actions we see produced in the animal body. We cannot, it is true, dive into those most secret powers that are exerted over us, and observe how the connection between soul and body is established and supported. But still we may go further, than we have already done in this Enquiry; and although we cannot so effectually prove the immediate Action

of the Mind, as in some former instances, yet a very striking Analogy with them may lead us very far in determining the truth.

It will be granted, that the conveyance of all Sensations to the Mind, and the propagation of Motion from it, through the system, is performed by means of the nervous influence, and that over this power the Mind has a free and unlimited authority, except when disorder has interrupted its progress through different parts; or by the sluggishness of the Body, it is made unfit for motion. The Mind, however, we have already shewn, never acts wantonly or without some motive, and is always passive, until it is excited to action by this means. Some foreign body that applies itself to our constitution, and excites it to act in order to expel it, is the first motive to action in an Animal. This is what we understand by the name of Stimulus; whether it acts upon any of our external senses, or internally and influences our general functions,

functions, or by a very great acrimony causes pain and uneasiness. The most simple action of this kind we have called *Irritation*; when it becomes considerable enough to excite consciousness, we denominate it *Sensation*; and when it is principally engaged with particular objects, and in a peculiar organ, we call it *Perception*. In consequence of the two last of these affections, Ideas are formed in the Mind, Passions arise, and the Soul exercises all its faculties. The highest power of the Mind is that of the Will, and differs very much in its action from simple Irritations, in the motives that induce, and the parts upon which its agency is exerted. The Action that proceeds from Imagination and Passion, seems to be a middle kind of Action between these two, and differs from both in Degree only. It seems to agree with the Action of the former, as arising from Ideas and a mental Principle, and yet it resembles the latter by acting upon the same parts. It differs only in being influenced by no stimulating

Body,

Body from the Actions which would, if that were present, be caused by it, and hence we may presume to determine its Actions to be of the same nature. But as this distinction seems very obscure at first sight, and will be difficult to ascertain without further reasoning.—Let us endeavour, if we possibly can, to discover the Analogy between the effects that arise from *Imagination*, and those that are acknowledged to proceed from a *Stimulus*, and hence deduce by reasoning the possibility of the resemblance.

I. THE first visible effect that a *stimulus* occasions, when applied to our Bodies, is a consequent *Irritation*, or a Motion in the animal Body, which is generally perceptible, either in the part affected or in some distant one. The first of these is evident upon the application of any substance to the stomach or intestines, and the latter in the action of Sneezing, by an irritation of the diaphragm. The idea of a Stimulus will cause the same kind of Actions. Who is
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not sensible of an inability to prevent the twinkling of the Eye-lids, from the view of any thing dangerous offered to be thrown at us, although at the same time we are assured that no danger will arise from it. In the same manner, how many people are equally affected with the idea of Vomiting, as if an Emetic had really been exhibited. The Passions likewise cause similar irritations. Thus the Heart itself is moved violently in a time of *fear* or *anger*, the Blood-vessels are strongly irritated in the Blushes proceeding from *shame*, the erection of the *Penis* arises from Motions in its small vessels, excited by peculiar ideas, and many other Actions are performed in the Body, which are sufficient testimonies of such a Motion caused by these affections.

2. THE next visible effect arising from a *stimulus* is Sensation. Every Stimulus indeed does not cause a Sensation, because the Body is so constituted that we shall have no feelings

feelings of any of those Actions which are absolutely necessary for our constant preservation. In many cases, however, it does produce Sensations. Thus every one knows what is meant by *feeling*, from acrimonious bodies, and can determine the nature of Pleasure and Pain. Sensations, however, no more than simple Irritations, are confined to the place where the Action is first begun, or where the Stimulus presents itself. Nothing is more common than its appearance in very distant parts. Thus Pain in the Head often arises from a disorder in the Stomach, and Pains in the Stomach from other Bowels that are affected. The ideas of stimuli affect us with Pain as well as the Stimulus itself. Thus sore Eyes have been induced from looking at another person affected with that disorder; and we need not repeat again the instance of Pain from reflecting on an Amputation, or any painful disease. The *passions* too very often create very stronge bodily Sensations. Fear is accompanied with a Pain in the Stomach

mach or Nausea. Anger occasions a Head-ach, and Pains about the Heart. Lust excites a grateful Sensation in the part of Gratification. Shame raises a violent Heat and glow in the Face; and Anxiety is the cause of various uncertain Pains in different parts of the Body.

3. ANOTHER effect, that is perceptible in our system, which arises from a *stimulus*, is a more copious *flow of humours* than was usual in some part or other of the Body. This is particularly evident when it is applied to any *secretory* organ: As for instance, when applied to the Eyes, it causes Tears; in the Nose, a copious flow of its own mucus; in the Mouth, of saliva; in the Stomach, of the *gastric* liquor; in the Intestines, bilious and pan-creatic juice, in the Kidneys, Urine, &c. The same may be alledged of the ideas of these substances, when they act upon several parts. Thus the idea of grateful Food occasions the Saliva to flow in great abundance, and many are

are the ideas that are liable to produce an involuntary secretion of Urine. The Passions have also a very powerful effect in this way. Fear, Anger, Jealousy, and especially Sorrow, nay sometimes Joy, excite a copious flow of Tears; but it is most peculiar to Sorrow, which is accompanied likewise with an increase of Saliva. Other passions have also their peculiar Secretions. The urinary Organs seem appropriated to Fear, and the seminary Secretion is dependent upon one appetite alone.

4. A FOURTH effect that evidently arises from a Stimulus, when it acts upon our bodies, is a Constriction or *Spasm* of the part to which it is applied, and sometimes of the whole Body. Partial effects of this kind, however, are most common, as they arise from slight causes. They may most frequently be observed in Burns, but sometimes from Cold likewise. Universal effects generally proceed from this latter cause, and are always present whenever we are exposed

posed to any violent degree of it. Cold, however, can act only in this instance as a Stimulus, because any other body of the same nature might be productive of it, as is evident in the Paroxysm of an intermittent Fever, where a Stimulus may sometimes be the cause of this disease. This effect indeed, is not accompanied at the time with either Motion or Sensation, but it seems to be the ultimate effect of an Irritation, and resembles more the event of a sedative rather than a stimulating power. But may not this afford us a conjecture, that every sedative power is only the excess of a Stimulus, or that the violent effects of Stimuli, always prove sedative. It may suggest likewise another supposition, that Sedatives act by causing a Spasm. But to proceed with our subject, The imagination or ideas of Stimuli, may in the same manner influence our Constitution, and be attended with the same effect: But it is most evident from the Passions, which always produce it. Fear is known almost

most by this effect; Anger is frequently attended with it, and every palpitation of the Heart, an effect so universal in every Passion, derives its origin from this source alone. From what besides this, can the Blushes arise in *shame*; and to what shall we attribute the various convulsive Motions that are so frequently observed, but to a stoppage of the vital influence from such a Constriction? Is not the slowness of the Pulse likewise in Anxiety an effect of the same original, and how is Death itself accomplished but by this means?

5. THE fifth and last effect that we shall mention of a Stimulus, visibly acting within our bodies, is a considerable increase of the Actions of the vital Powers, by which are meant the Heart and Blood-vessels. Parts of our system indeed of the utmost importance, upon which it is entirely supported, and whose deviations from what is right, affects us more immediately with disorder, than the injury of any other function.

tion. This distinction was most certainly included in the first that we adduced of the effects of Stimuli upon us; but it is worth while to consider it apart, as the Analogy we could wish to settle will appear the most evident from it, and as the passions have a peculiar influence upon these powers. It has been disputed, whether their action is always dependent upon a Stimulus; but we shall enter no more into this question, it is very evident that when any extraordinary body of this kind affects them, it quickens and expedes their motion. This is clear, not only from the probable effect of Acrimony, when it obtains in the system, but from the experiment of the learned and judicious, upon brute Animals, where such things could very easily be applied. Whenever indeed, Stimuli act upon these powers whilst entire, they never raise any Sensation, and it is so ordered that we shall have no consciousness or feeling in them, but from an accelerated motion. We argue concerning their pre-

sence therefore *a priori*, that if Stimuli are necessary to excite actions, and we see an additional force produced, it is a proof of the presence of such a substance to occasion it. The argument will be more satisfactory, with regard to the influence of the passions, because we can evidently perceive them present at a time that the force of the Heart is increased. Anger seems to be the most powerful passion in this respect, for it always produces something of this nature, is often accompanied with a temporary fever, and sometimes terminates in the worst of consequences. Fear is likewise productive of the same effect, and all those other passions that create Spasms, Convulsions, and Palpitations. But it must be observed, that in these last instances it is produced in a secondary way, and as dependent upon those prior consequences, that form a resistance to the vital Powers, which requires the highest of their abilities to overcome.

To explain the method by which the Mind can produce these effects, similar to what are excited by a Stimulus, is not so difficult as might appear at first sight. If there is a particular power in the animal Body, which is excited to motion independent of the Mind, if the irritable part of our nature is induced to action from Elasticity, or any other mechanical means, and if Stimuli act by some relation to it, the whole of our reasonings will fail, and be of no use; but if all action proceeds from a mental faculty, and the action of Stimuli, as we have shewn, proceed from it likewise; our theory will easily be established. The Mind is to be considered as the prime agent in all cases, and the whole difference of action is in the motives which excite it. When a Stimulus acts upon the Body, the Mind in consequence re-acts upon it, and in this case this substance is to be considered as the motive which induced the action.

But it is not necessary, for the Mind always disposed to act, may meet with others that can produce the same effect. Every thing that can possibly affect the Mind, may constitute the motives to its action. Imagination and Passion certainly have this power, and hence we deduce their influence in those motives which we have mentioned. We have seen their presence, unrestrained by any peculiar organ; and have found a resemblance between theirs and the common actions of stimulating substances. We have liberty then, I think, to imagine they have a licence to range over that vast field which acknowledges such a power, and to become equally vigorous in producing the same kind of actions.

It may be worth while to mention, before we leave this subject, another circumstance, in which these actions resemble each other; and that is as they refer to our Consciousness or Sensation. The mere ideas
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of a Stimulus or any acrid Body, are accompanied with a seeming Consciousness of such a substance; but it is not so with the Passions, they arise from a pure effort of the Mind, without referring to any material substance, and hence, previous to their action, we perceive no sensation in the Body. We feel, however, the actions or consequences arising from them in the same manner as we do those of simple Irritations. The reason of this is evident, Passions seem to act on those parts of the Body, whose continual exercise is necessary for the preservation of life, and therefore are made insensible to any Stimulus; but the Imagination must act upon the sensible parts, which have no necessity for any regular uniform Motions.

S E C T. V.

*Of the influence of Imagination and Passion
over the Functions and Disorders of the
Body.*

THE extent of these powers is so great, that it would require a very large volume to examine into every particular concerning them. We shall content ourselves therefore with some few remarks upon the principal kinds, from which every other may easily be deduced. We shall begin with some of the necessary Functions of our system, which acknowledge their influence to expedite or retard them. Such a consideration naturally suggests itself, for we have seen *a posteriori* that these powers enjoy a great authority over the whole Body, and from *priori* that the irritable part of it is entirely under their direction. And it is from this part, indeed, that we
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may imagine the Body is preserved in that state of perfection we find it possesses ; that nourishment is promoted, every secretion and excretion performed, and the general circulation of the fluids maintained. We shall not take particular notice of these general functions, by which the vital powers are governed, because we have so often demonstrated them in the course of this work. We must beg leave, however, to offer some thoughts upon an effect that may proceed from them as a cause or principle of action. This is the various *temperaments* of mankind, which form so great a distinction between the particular species. It has been usual, to deduce the different affections of the Mind from these temperaments of the Body, and that these being formed by a mechanical cause, all the variety of Tempers, Dispositions, and Passions have arisen from them. With equal justice, we may reverse the distinction, and from what we have advanced, demonstrate that the difference of Temperaments

is owing to the Passions and Dispositions. These are always correspondent to Ideas, depend upon them, and arise in the Mind, in consequence of the advantages or evils that are apprehended in their objects. The mere corporeal frame, can suggest no other ideas but its own feelings, and hence is no otherwise the cause of passions, than as by it we perceive objects either with ease or difficulty. In general, according as they are presented in greater or less number, or differ in their own character, with respect to utility or advantage, the different passions arise. But there is no necessity for any change of the Constitution to produce them, that is only an effect that afterwards proceeds from their influence. In order to confirm what we have said, we may observe, that the passions correspond very much to the ages and situations of life. Love is the passion of Youth; Ambition of riper Years, and Avarice of old Age. But can these passions in such circumstances arise from any prior effect induced in our system;

system ; or do they not entirely depend on the ideas that are suggested at such ages ? What Constitution can we suppose requisite, or what is there necessary in the body of an old man, that without reflection should incline him to a covetous disposition ? But this passion may very easily be accounted for from the apprehensions of this aged person, from a consciousness, that his abilities are impaired, and his capacity to maintain himself destroyed ; and in consequence of this that the only means to make his life easy, is carefully to preserve what he has already obtained with so much industry. Besides this, how is it possible, that a difference in the circulating fluids, of which we are not sensible, should influence our passions, when they depend entirely upon ideas. We have seen very clearly that Passion has a great influence upon our Bodies ; and hence, when we perceive two actions present at the same time, one of the Body, the other of the Mind, is it not most rational to suppose that to be the cause

cause of the other, which we know can act, than that of whose abilities we are quite uncertain. But, not to dwell any longer upon this subject, the different temperaments, as well as passions, are perhaps absolutely independent of each other, and are only effects proceeding from the same original cause, viz. the almighty hand of the Creator. As the passions, however, have a considerable influence over our bodies, when they are constant or violent in their actions, they may obstruct the general temperament or promote it, and introduce an alteration into our Constitutions. And this may very easily be done, from any other source that we may imagine temperament to arise, either a difference in the circulation of our fluids or in the fluids themselves, that are carried through the system, for both depend on the irritable part of the Constitution.

It will be of more importance to consider the influence of Imagination and Passion

sion upon the several Secretions, where it can be more distinctly marked. It has been sufficiently proved by the late very ingenious Dr. WHYTT, that it is by a sensible, or according to our ideas, by an irritable power, that the actions of the smallest vessels are carried on in our bodies, and that this power depends upon the nerves, and a mental influence. If this is absolutely the state of the case, we may argue *a priori* that the Imagination has a very forcible effect, in promoting or retarding the different Secretions. But the fact is true from experience. The Tears are secreted in a much greater quantity, when we are affected with grief than at any other time. They have been observed to flow in many persons for days and weeks in great abundance. The supply in such a case must be very considerable, if they had been already deposited in any receptacle for that purpose, and the greatest inconvenience would have accrued from their stagnation, if objects had not frequently occurred to occasion their flow.

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Many persons never weep from the want of circumstances to occasion it; but yet we cannot suppose they are devoid of the proper organ for this purpose, neither are they less subject than others to disorders from this source. Besides this, Fear causes an increased secretion of Urine; Anger, of Bile; Anxiety, of Saliva and Lust of the Semen; so that each of these passions may be distinguished almost by some particular Secretions that are adapted to them.

WHILST we are upon this subject, we may take notice of the influence of the Mind, in the production of the adeps, or oily part of our body, which we may very justly call a Secretion. We see the increase of this substance in a great measure dependent upon a chearful and lively disposition, which engages in a few disagreeable ideas, and is a stranger to Anxiety and Care; whilst Grief and Sorrow, or troubles of any kind, tend in a great measure to suppress it, or to dissipate it. They have most
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probably the latter effect, and the violence of the passion excites an overflow of the Secretion. We may draw an Analogy between this effect, and the flow of Tears, which is caused by Anxiety; with this difference, however, that the secretion of Fat, as of more use to the system, is accumulated when it is not carried off by the influence of that passion. From *Grief* indeed we may deduce an universal power of increasing Secretion, and of dissipating the effects of it. The Tears, Saliva, and Urine, evidently admit of this circumstance; why may not the Fat be a product of the same kind, and imperceptibly be wasted and carried off by the same means? If this is true, how evident is the force of Imagination upon the secretory Organs? We cannot conclude this subject without a further observation, that the Secretions of the Tears, Urine, Saliva, &c. may be considered as having Excretories that constantly attend upon them, over which the Imagination has an equal force. The Adepts, however,

however, has no peculiar Excretory of this kind, but the pores of the skin perform this office, are visibly directed by the same power, and are influenced in a very peculiar manner by Grief and Sorrow.

BESIDES, those general functions, we have already mentioned, we may take notice of some others which can be reduced to no particular heads. Of this kind is an affection of our bodies, which seems to possess a very great influence over their motions, and therefore deserves our particular notice. This is a sympathy, or affection in the sensible, as well as irritable power, in distinct parts, from where the first impression was excited. Dr. WHYTT has evinced it, almost by a demonstration, that it is not owing to the communication of nerves; but demands a more immediate mental influence. But a sense of utility and advantage, or a natural impulse to assist particular operations, can never be satisfactory to any theory, but as it appeals to
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original ideas. In fact, this affection very much resembles the effects produced by Imagination ; and from hence we may presume to conjecture, that it is a species of that action we have deduced from it. And if it is so, it serves very well to illustrate some other effects produced by that power.

IT is not only whilst we are living and acting, and receiving impressions from different objects, that Imagination interferes in the functions of our bodies ; but it acts even whilst we remain in a dormant state of inactivity, in the womb of our mother. Hence it is, that we see the violent effects of passion upon the child, as it is brought into existence, as well as upon the parent that brings it into the world. From this many peculiar circumstances may happen, which otherwise cannot be accounted for, as deformities and connate disorders. But the most striking effect is what proceeds from a very forcible desire of a particular object.

object. This phenomenon will be very difficult to explain as well as conceive; because it is an effect produced in the body of another, superior to what is produced in ourselves, by any influence of Imagination. It has been the fashion of late to deny this theory, and even to exclude it from any serious attention. There are few theories indeed in which it can be included, and Mechanism is certainly contradictory to any such effect. We shall not pretend to demonstrate the truth of the fact, an accident, or many other circumstances, may induce us to imagine resemblances, which cannot be supported, when things of this nature have happened. If we suppose, however, that the bodies of the Fœtus and Mother, when joined, not only enjoy the same circulation, but that there is an equal connection between the solid and firm, and of consequence the nervous and irritable parts of both systems; we may then suppose that the Mind of the one may have an effect upon the Body of the

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the other, and make a particular alteration in its system, with which afterwards we form a resemblance with an object, that might in the time of pregnancy be desired. We may likewise imagine some effect of this kind, from another supposition, viz. a sympathy that may prevail between the corresponding parts of both bodies. There is another circumstance, which I think as difficult to be accounted for, which is the resemblance between Parents and Offspring, but which no one has pretended to deny. I leave then the former question to be determined by those who are skilful enough to explain the latter phenomenon.

It remains now to consider only the Disorders of the human Body, which the power of Imagination is capable of producing in it, a vast and important field, the verges only of which we shall pass over, by deducing them from the causes which we already mentioned. Most diseases depend upon the irritable part of our system,

in consequence of this we might derive all of them from this source. This, however, we shall not attempt at present, we shall only endeavour to shew how Imagination produces those, in which we see it acting as a cause, or where there is great reason to presume upon its power.

THE most common disorder of the human constitution, the quickest in its solution, and most fatal in its consequences, is *Fever*. If we examine into the common causes of this distemper, we shall find it arise either from the presence of something acrid, immediately to promote the vital influence, or from some obstruction to its power, which requires the violence of this disorder to discuss. These obstructions may proceed from a preter-disposition of the body, or from a spasm upon the small vessels, induced by a stimulus. We have already seen that the passions act in a manner similar to this substance, and from experience, we find that this disorder is produced

duced by them. But as stimuli act very differently in producing the various kinds of Fevers, so do the Passions. Anger seems to act by an immediate influence upon the heart, by exciting it to a quicker motion; so that the Fever of a man, subject to it, is often temporary, like what attends drunkards, and is not accompanied with a cold fit. Sometimes, indeed, by the violent commotions it raises, it forms obstructions, by forcing the blood into the small vessels of different parts, and thus occasions Pleurifies, Peripneumonies, and other topical inflammations; or instead of these, it creates an overflowing of the Bile, which mixing with the Blood, puts on the appearance of Fevers, proceeding from that source. Fear seems to act in a very different manner; for it appears in the form of cold, or a very violent stimulus, which destroys the tone of the fibres, and induces a spasm or constriction over the whole constitution, and upon this account it occasions most commonly that sort which is intermittent. An-

xiety again, acts in a much slower manner, and by its gradual influence tends to procure alterations in the circulating fluids, and thus brings on those of a putrid and malignant, as well as the slow and nervous kind. It produces these disorders likewise from a spasmodic quality, by which it enables the body more readily to imbibe and retain contagion and mias mata.

WHEN we reflect upon the number of disorders which are attended with Fever, we shall not be surpris'd to find, so many that occur from the passions of the Mind. But besides these, they have been found to possess a very considerable influence over those that are called chronical, or more properly, what are free from this general disorder. Nothing is more common than for latent *schirri* to be rouzed by a fit of passion, and become *cancers*, when no other cause could possibly interfere. This is most probably effected by creating an Irritation in the small vessels, where the obnoxious
matter

matter lies, and raising a circulation in fluids, which whilst they were stagnant, were innocent. Rheumatism and Gout likewise have often been observed to be very much affected and promoted by the same means. And this may happen, whether these disorders are occasioned by a peculiar matter separated from the blood, or an affection of the living solids. The arthritic matter, if it is allowed, may by these active powers, be driven from its recess, and lodged in the parts where we see it raging. In the same manner *Calculi* of the Bladder and Gall ducts may be formed. They no doubt very often arise from a constriction upon the urinary and hepatic passages, which lessens their diameters, and unfits them to carry off the matter that forms the Calculus, and which in consequence of this is deposited where it is found. A Phthisis of the lungs often arises from constrictions, and not only of these, but of the disorder itself, the passions have been found to be an evident cause. And

in fine, we have the authority of very eminent Physicians, that the Hydrophobia, which seems to be a spasmodic disorder of the throat, arising from a particular stimulus, has often arisen from these causes, when no infection was received from any mad animal, or any of the human species which had previously been infected.

BUT those disorders merit our particular attention, which have been ascribed to some violent affection of the nerves, or injury of the brain itself. Thus *Apoplexy* and *Palsy* seem to be owing to a pressure upon that substance, whilst the more spasmodic and convulsive diseases owe their rise perhaps to the irritation of a stimulus. We see however all of them produced by the excess of our passions; but it is most reasonable to suppose that the former, are not so much the immediate as the secondary effect of their influence, in the same manner as they produce *death* itself. It is not

in the least surprizing, that by the violent commotions, that are raised in the system, the blood should be driven into the small vessels of the brain, and that this tender substance, incapable to expel it immediately, or to raise an inflammation for this purpose, should be affected with these disorders.

THE spasmodic or convulsive affections of our system, of which the chief is Epilepsy, may proceed from the immediate action of the mind. We have seen already that convulsions and palpitations of the heart proceed from almost every passion, and when they have been raised to their greatest height, so as to produce those disorders which rage often the worst in the human constitution, they have been attributed to passions of various kinds. Many cases of Epilepsies may be deduced from HOFFMAN and other writers, where no other cause could possibly interfere. But not to dwell too long upon this subject,

ject, we shall conclude it with an example from Dr. WHYTT's late very ingenious Essay on nervous Disorders. In that Treatise he produces a very beautiful instance of a young man, who was seized with a Catalepsy, from a disappointment in Love, and was recovered from it, only by a promise that he should enjoy the object of his affection. It has been imagined by some, that these disorders proceed from a stimulus that disagreeably affects the nervous power, if this be allowed, our sentiments will not only be easily inferred from it, but they will tend to illustrate that theory.

OF the spasmodic and convulsive, or what are called nervous disorders, are the Hysteric and Hypochondriac Affections. These have generally been considered as the same, and have been thought to differ only in the sex that they affect. But they may certainly be distinguished from each other in many other respects; in their symptoms, their causes, and their method
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of cure. We shall not attempt to examine them accurately in all these particulars. The whole that we shall endeavour to do, will be to point out a difference between them, that seems to result from our subject. They have both been considered in some measure as disorders of the Imagination, such an influence being always present when they are produced. For not only low spirits, fantastical ideas, and imaginary symptoms, have given rise to them; but a fit of passion, great disappointment, envy, jealousy, an excess of love, and great grief, seems to have been equally instrumental in their production. Notwithstanding this however, both these diseases do not seem directly to flow from these causes, nor do they act upon the body in the same manner; but one of them seems to be a primary, whilst the other is a secondary effect of their power: Besides this, the Hypochondria may be produced without passion; but the Hysterics seem as if they

they never could. These sentiments result from the following observations.

1. THE cause of the Hypochondria is often a sluggishness of the fluids, proceeding from indolence and inactivity, long study and application, the stoppage of other diseases, or some circumstance of this nature; whilst the cause of Hysterics is too great an activity of the body, proceeding from some violent affection of the mind.

2. THE cause of the Hypochondria acts in a slow, deliberate, and determined manner, whilst that of the Hysterics is more active, violent, and outrageous.

3. THE persons subject to the Hypochondria are grown up to mature age, very often are even old people, and are of the phlegmatic temperament; whilst hysterical people are almost always young and of

the sanguineous temperament, or most commonly are not to be distinguished by this circumstance.

4. The Hypochondria is an hereditary disease, and fixed in the constitution; but the Hysterics are common to every one under particular circumstances.

5. The symptoms of the Hypochondria are a previous weight, heaviness, and uneasiness about the præcordia, but without the loss of sense, with no violent spasmodic contractions, and no regular paroxysms. The Hysterics, on the contrary, come on without any previous pain, are attended with violent paroxysms, loss of sense, and spasmodic contractions of the internal parts. From these circumstances we are induced to think, that the Hypochondria may be produced without passion, and proceeds from some obstruction in the body; that when passion is the cause of it, it is by bringing on this obstruction; and that the
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lowness and depression of spirits which attend it, are the effect of an active mind endeavouring to overcome the activity of a sluggish body. The hysteric affection, on the contrary, we may consider as the immediate effect of a passion of the mind, which acts as a stimulus upon the body, and produces violent spasms and contractions in different parts. It is not dependent however upon any particular passion, or confined to any sex. Fear, anger, anxiety, and love, are equally productive of it. It is to the last of these, indeed, that it is most frequently to be ascribed, and as in the delicate sex this passion seems more lively and animated, it has been not only appropriated to them, but has been thought to proceed from the uterus. It is an opinion, that is probably so erroneous, that it was worth while to controvert it; and we hope we have not entirely failed in our attempt, when we have endeavoured to establish this disorder upon a foundation more agreeable to the symptoms with which it is accom-

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panied, and the affections of mind, that are always present at its access.

IT might now, perhaps, be thought necessary that we should enquire into a further act of the mind over the body, and evolve those actions that proceed from the will. A power of the soul infinitely superior to any that we have as yet examined, where its motions are in the body more evidently to be perceived, and which can effect a more considerable influence. But yet, as it is confined to a particular system, and can enjoy very little authority further than its own acts; as none of the necessary functions can possibly depend upon it, nor any of those disorders which infest the human constitution; and besides, as its power is so evident as to require no proof; I hope we shall have a sufficient excuse for entirely omitting a consideration of this kind.

CONCLUSION.

IT is necessary, however, before we entirely leave the subject to deduce from it a consequence, that may be of service to mankind in a moral and religious view, as well as being the necessary effect of a natural truth. If we have in any measure demonstrated, that the least atom cannot be moved from its place, but by the intervention of some spiritual being; that the vegetable tribe acknowledge the direction and governance of a peculiar agent; and that the lowest action in our bodies, is performed by a part of that thinking and rational principle which conducts the highest and most noble; have we not the most satisfactory proof of the existence of substances, independent of body, and divested of all materiality. We may infer likewise from this truth, that this ethereal substance

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partakes of none of the affections of matter, and that nothing is more ridiculous than to say the soul can be divided as the body is. It must always be considered as a superior agent, which notwithstanding it can act upon no other body, yet acts upon that part alone which is entire and sound; and when part of that is taken away, we have no right to say any otherwise, than that it acts over a lesser part than it did before. From the whole then we may conclude, that the soul is necessary to the existence of the body; but that that form of matter is so far from contributing to its powers, that it confines and shackles them. And from hence we hope, one day or other, to be freed from these chains, and be raised up to a more glorious existence, where it can exercise all its faculties with greater liberty, and be independent of such disagreeable restraints.

F I N I S.

The first part of the book is devoted to a general
description of the various forms of life which
are found in the different parts of the world.
The second part is devoted to a description of the
various forms of life which are found in the
different parts of the world.

The third part is devoted to a description of the
various forms of life which are found in the
different parts of the world. The fourth part is
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The ninth part is devoted to a description of the
various forms of life which are found in the
different parts of the world. The tenth part is
devoted to a description of the various forms of
life which are found in the different parts of the
world.

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